NATURE MAGAZINE
VOLUME 28 · SEPTEMBER · 1936 · NUMBER 3

Footsteps In The Forest

By ARCHIBALD RUTLEDGE

Illustrations by Edmund J. Sawyer

I WAS watching an old buck under an apple tree, this tree being a lone survivor of what had been a mountain orchard. On the top of an immense grassy hill it stood; at some distance below it on all sides was the deep forest. It was well after sundown, and the radiant afterglow was suffusing the world with tender iridescent lights. In that radiance the great stag looked larger than natural, and his noble outline was silhouetted clearly against the brilliant sky. I was maneuvering to approach him, and had managed to get in such a position that the mild evening air was blowing from him to me. He could not wind me. But he might see me or hear me. In the twilight I kept edging up the border of the field to get nearer to him. Just when I had come about as close to him as I thought I dared to venture without alarming him—and I was still two hundred yards away—I heard in the woods nearby a troop of deer coming out to the dusky field to feed. They were going to join the stag; and they made a great noise in the dead leaves. I should say that the racket they set up could have been heard for several hundred yards. Not only were they kicking up the leaves, but they were breaking dead branches and rolling little rocks down the steep hillside. In a few moments they came trooping out into the field, and headed up an old fencerow toward the buck and the apple tree. It was with some surprise that I noticed that the stag had paid no attention whatsoever to the noise they had made in the woods. And his nonchalance gave me an idea: I would sneak around through the cover of the woods, just as the herd of deer had done. If he had paid no attention to the big noise they had made, why should he give heed to my muted footfalls? Why, indeed?

But no sooner had I begun to walk stealthily through the dead leaves, though I was completely hidden from sight, and though it was impossible for the buck to wind me, than he gave a loud snort, and in another second was gone over the hilltop. There is only one way in which to interpret his behavior: he had recognized the step of a man, distinguishing it from the tumultuous shuffling that had been made by his fellows.

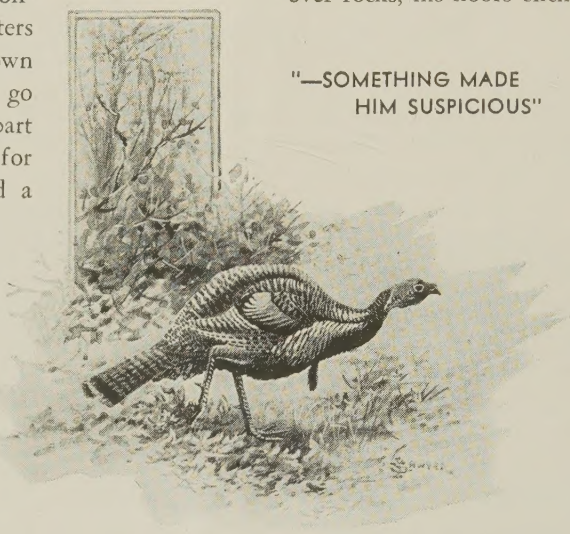
This incident serves to introduce a subject that should be of interest to all those who love forests and their wild inhabitants; and that subject is the matter of wild footsteps. Clearly, I think, they can discriminate ours. Can we recognize theirs? That is, can we identify the approach of certain birds and animals if we hear nothing but their footsteps? I think we can; and here I give certain identifying features by which one can tell what kind of a wild thing is approaching him in the woods. It seems best to illustrate what I mean by giving simply some of my own experiences in the wilds.

I have said that the troop of deer made a good deal of noise; but they were all does, and they were hungry. Moreover, they were following by scent the track of the buck; hence they were off guard. As a rule, a lone deer is one of the wariest walkers in the woods; and it is astonishing how little sound he makes for so large an animal. One day I was sitting beside a spring on a wild slope of mountain. There was no wind. The leaves were fairly dry. Below me I was watching some gray squirrels at play. After a half-hour I heard a slight sound immediately behind me—a sound not nearly so evident as that which the squirrels were making. Turning my head, to my astonishment I saw, not thirty feet behind me, a ten-point buck. His approach had been positively spectral. Silently out of the silent forest he had come. Of course, when he once made me out, he abandoned his furtiveness, and crashed away through the woods, counting on his speed rather than his secretiveness to save him.

In the wild mountains in which I do most of my roam-

ing, deer, turkeys, grouse, and hunters are the living creatures to whose footfalls I give the most attention. Then, too, there are the squirrels. When I am on one side of a ridge and a squirrel is on the other, I can always tell him by his habit of frisking around in the leaves and then jumping; he will make a great scurrying, and then give a leap. No other wild thing makes the same series of noises. A little practice in the art of listening will enable you to identify a squirrel even though you do not see him.

When it comes to the wild turkey, I think you have a surprise in store for you; for of all creatures known to me, he walks most like a man. On many an occasion I have not been able to tell whether one of these great kings of the wilderness was approaching or whether I was listening to the coming of a lone hunter. Despite his acute wariness, the wild turkey is a careless walker. While the deer is shadow-footed, the turkey seems unaware of the noise he is making; and the racket made by a flock is almost tumultuous. Unless frightened, or unless bent upon going somewhere within a limited time, the turkey is a great idler. He does a lot of strolling. I might say that he saunters through the woods. I have known one to take a full half-hour to go two hundred yards. Of course, a part of his time was spent in looking for food, so that his dawdling had a purpose in it.



"—SOMETHING MADE HIM SUSPICIOUS"

One day I was sitting on a log just below the brow of a ridge. The air was damp and still, so that noise traveled far; and a certain degree of wetness of the leaves affords to footsteps a more clear-cut sound than their dryness offers. For when leaves are very dry, there is so much crackling attending the sounds made by walking that it is difficult to identify the stepper. When I heard this steady "tramp-tramp," I thought that a hunter was coming toward me. Even the pauses that the walker made were as characteristic of a hunter as of a wild gobbler. But there was one difference: every few minutes I could detect a sedulous raking of leaves; then stillness; then more walking. I knew it was a lone turkey, pausing every now and then to scratch for food. Crawling up to the brow of the ridge, where I was shielded by a tangle of wild grape vines, I peered over; and there, about thirty yards below me, was a regal gobbler. At that very moment he was scratching; but something made him suspicious. He had drawn back his right foot, full of dead leaves, and it was off the ground. In that strange posture he stood, poised on one leg, his other extended behind him, while he listened with those ears that have few rivals in all the world. As nothing happened to startle his highness, he put his right leg gingerly down, and then straightened up to his full splendid height, searching the woods with those eyes which likewise have few rivals. Then he started to step away, his deliberate and heavy tread sounding precisely like that of a man. Indeed, hearing another noise behind me, I looked back; and in the hollow below me came a hunter, sneaking along, and pausing every few moments to listen. I had an excellent chance to compare the footfalls of the hunter and the hunted; and they were practically identical!

No one, I think, ever should mistake a deer's walk for that of a man. In the first place, the deer, being a quadruped, cannot take the even, regular footsteps of a man. This business of walking with four feet always creates more or less of a shuffle, and I have found that a deer is more inclined to drag his feet in leaves than a wild turkey is. A deer's approach is usually heralded by a subdued stirring, the separate footfalls being hardly distinguishable, whereas the wild turkey tramps rather boldly along. Of the two, I should say that the deer, despite his size, makes the less noise. In fact, on pinestraw or on sand, the deer makes no sound at all. However, I have sometimes located an unseen deer when he was walking over rocks, his hoofs clicking delicately.

While I suppose that "footsteps" could hardly be applied to a serpent, yet I think it is interesting to be able to identify a snake's presence by the sound he makes in crawling; and on more than one occasion I have been saved from danger by recognizing this characteristic faint noise. Practically noiseless in his movements except when the leaves are dry, the reptile is usually a slow mover. Of course, a black snake or a kingsnake after his prey is one of the swiftest things in Nature. In moving over leaves, a snake makes a whispering and ticking sound, the ticking being caused by the fracturing under his weight of the tiny dead fibres of the leaves. There is a certain lulling monotony about it, a subdued and sibilant movement; and, since the whole body rests on the ground, there is the suggestion of a continuous sound, such as one out of Nature. It is not that a snake is not a wary reconnoiterer as he advances; but in moving, his points of contact, as it were, are so many that the sound he makes is unlike that of any other dweller in the woods. Occasionally this noise has a raspy or scaly sound, depending on the nature of the terrain over which the reptile is crawling. As to the deliberateness of the advance, everything depends on the species and his character as a stalker or as a hunter. The black snake, I think, excels all our snakes in speed that is not the result of terror. In some ways the rattler can be too fast for our comfort and safety; but in ordinary movements he shows extreme deliberateness. Few spectacles of Nature are more impressive than to watch a great diamondback moving through his native

haunts. He goes as straight as an arrow; and he moves with a poise and a dignity befitting his majesty. I remember timing one when I was unobserved; and it took him twenty minutes to go about thirty feet. When retreating from an enemy, especially a man, this serpent may not perceptibly increase his speed; but he will lift his sheaf of rattles, and sound them softly for warning as he slowly withdraws.

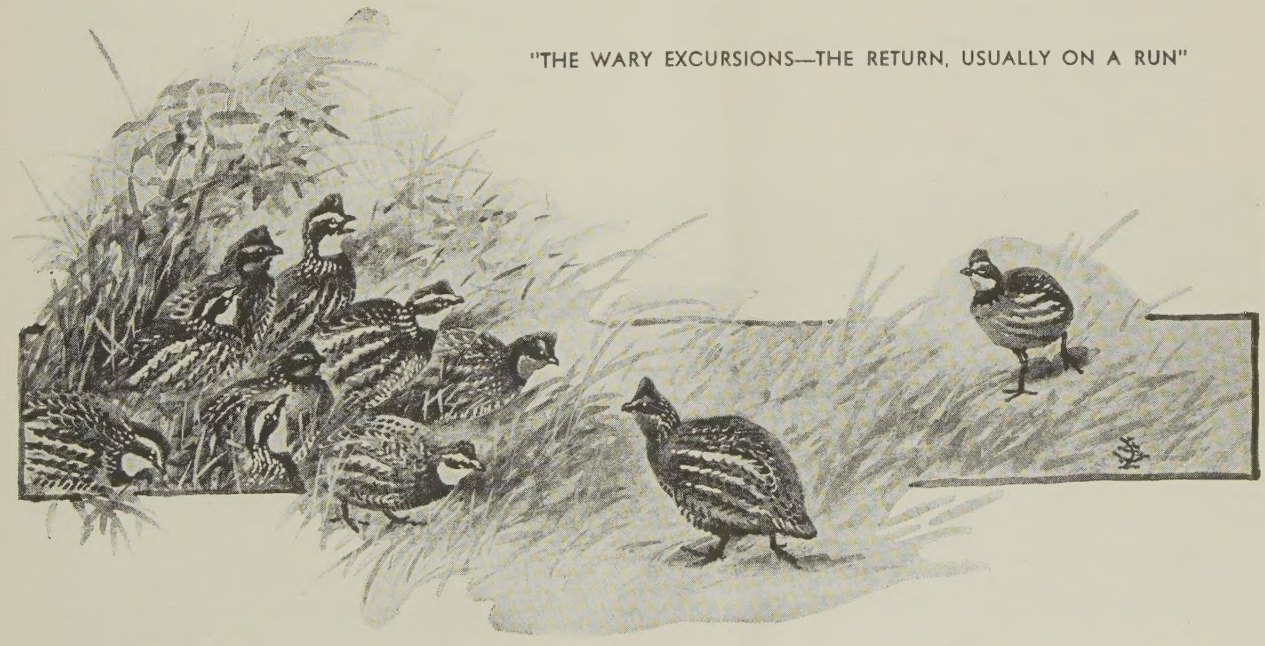
The ruffed grouse, that I have long considered the finest of all American game birds, does much walking in the woods; and as he is a very heavy bird for his size, one can hear him, when conditions are right, for a considerable distance. He steps like the patrician he is. As he moves, his body is usually horizontal with the ground; but when he pauses, as he does often, he straightens himself up, a posture that gives him his tailor-made appearance. If one hears a single bird, he can nearly always identify it; but if there are two or more grouse, the sounds they make are likely to be confused. Yet so distinct is the walking of one of these lone princes that I have sometimes taken one for an approaching wild turkey.

"HE STEPS LIKE THE PATRICIAN HE IS"

One of the most beautiful sights in all Nature is that of a covey of quail on autumn leaves. The ground is covered with tattered gold. The air is full of spiceries: aromas from the pines, the mosses, the damp hickory leaves. Here in a dogwood thicket I sit on an old stump, waiting for what will come along. I hear squirrels scurrying, and an old cock grouse walks out of a dense greenbriar tangle beside a stream. Then I hear sweet elfin voices, and along with the voices a tumultuous rustling in the leaves. Quail never seem to be able to make up their minds whether to walk or run; and birds in a covey are forever making little excursions away from their fellows, and then excitedly returning. When aware of the presence of an enemy, the bobwhite may become one of the most silent of birds; but when off guard, he is an affable fellow. I have noticed that the voices of individual birds in a covey vary greatly; and I believe that in such a group each member recognizes the voice of each other individual. Yet, while the listener can often detect the approach of quail by their flutelike minor voices, if they happen to be silent he can distinguish their footsteps if he will give heed to the characteristic way in which they step: the exquisite daintiness of it, the wary excursions of individuals away from the flock; the sudden return, usually on a run.

A man can keep out of a lot of mischief and he can find much innocent enjoyment (which is one of the greatest things in life) if he will betake him to the wilds to listen to the footsteps in the forest.

•



"THE WARY EXCURSIONS—THE RETURN, USUALLY ON A RUN"

What Do You Know About Honey?

By PAUL GRISWOLD HOWES

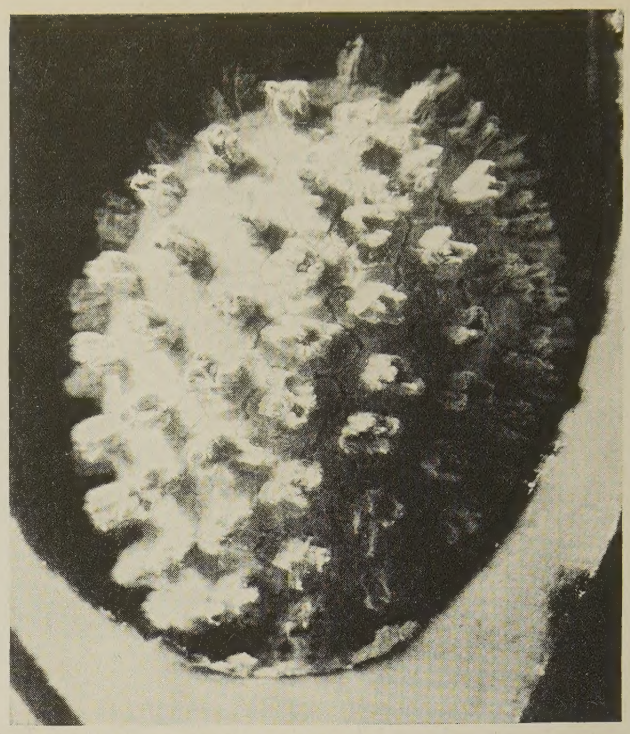
Photographs by the author

FROM THE earliest times, doubtless even during those remote "cave man" days, *Homo sapiens* knew the delights of honey. What he then called it, before it became "food for the Gods," we probably shall never know, but if those distant relations of ours were casual observers, just as the majority of us are today, doubtless they came to the simple conclusion that honey, completely manufactured, lay enticingly in every blossom, waiting only for the bees to transport it to their nests.

In this they were far from the truth, for, startling as it may sound, there is no honey, as we know it, in flowers! True, we may break off the end of a honeysuckle blossom or pull the pink blooms of clover and draw what would seem to be honey to our lips and tongue. What we so obtain is sweet, but flavorless; it is not honey, but nectar, the raw material for honey.

This nectar is secreted by the flowers in nectaries usually situated at the base of the corolla, the term used for the petals collectively. In other flowers, such as the larkspur and the violet, the nectaries are in the spurs. There are doubtless other modifications, but this fluid that they produce is chemically quite different from finished honey. The latter is manufactured in the bee's stomach, the process taking place between the time the bee leaves the flowers and its arrival at the hive, where the newly-created sweet is regurgitated into the cells of the honeycomb.

Since most individual flowers contain such a minute quantity of nectar, it is very difficult for experimenters to collect enough of it for purposes of analysis. This can be understood when we realize that in order to produce a little more than one gram of honey, the bees must visit at least two thousand rhododendron flowers, and even a higher number of other familiar blossoms.



BEES ENJOY THE SKUNK CABBAGE

An enlarged photograph showing the part of the bloom that the bees seek. The honey is not impaired by the odor of the plant

Professor Planta of the University of Zurich, who has studied nectar for many years, was able to obtain enough from two or three sources, the trumpet vine for one, to establish the fact that this nectar consists of 15.27 per cent sugars, only .43 per cent of which is cane, the remainder being grape sugar. There are two grape sugars, one known as dextrose and the other as levulose. One is crystallizable, the other is not, and when they are in a mixture, the substance is called glucose.

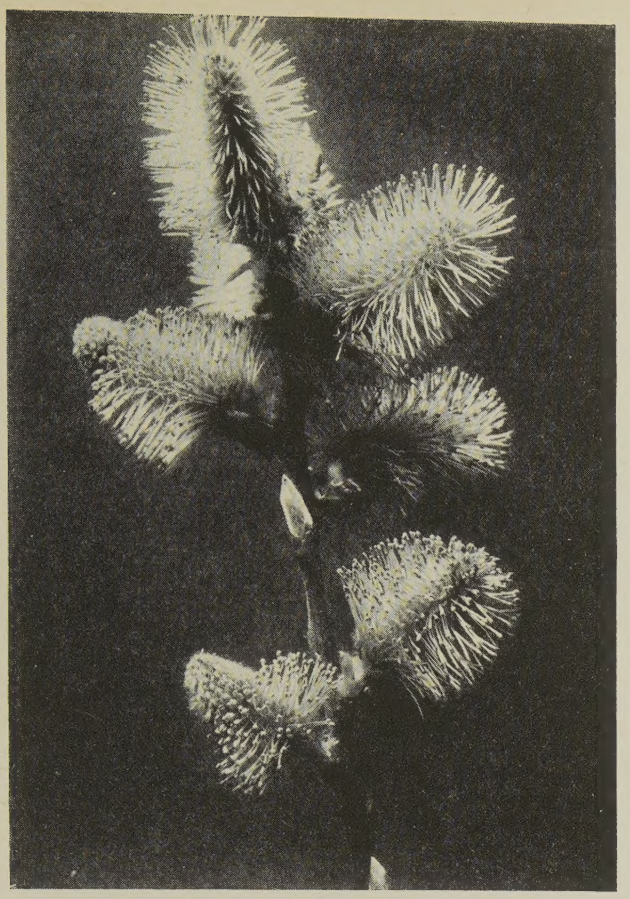
The other interesting fact that Professor Planta established is that a ferment in the saliva of the honey bee possesses the power of breaking down cane sugar into glucose.

Honey, of course, varies somewhat in its make-up because of the different types of flowers that the bees visit, yet the flavor is always pleasant. Generally speaking, it is a mixture in varying proportions of the three sugars—glucose, fructose and sucrose. There is water in it also, and foreign matter such as pollen grains, which, if discovered with a microscope, supply pretty substantial evidence that the substance is genuine honey.

Besides these substances, honey contains such elements as iron in readily assimilable form, sodium, calcium, sulphur, magnesium, phosphoric acid and albumen. Other chemists have reported

A HONEYBEE AT WORK

Obtaining tiny drops of nectar from elderberry blossoms



PUSSY WILLOW CATKINS

Bees seek these before the chief honey flowers blossom

substances unfamiliar to the layman, namely terpenes and higher alcohols, and there are doubtless still other compounds yet to be found.

Glucose and fructose, or fruit sugar, are simple in their chemical make-up, belonging to a group whose formula is $C_6H_{12}O_6$, which simply means that each molecule of these sugars is made up of six atoms of carbon, twelve atoms of hydrogen and six of oxygen. Sucrose, or cane sugar as we commonly call it, is more complex, containing approximately twice as many atoms of these three elements. It is twice as sweet as the other two sugars and its formula is $C_{12}H_{22}O_{11}$.

Honey is one of the best of foods, and it is evident that the demand for it is growing. Many roadside stands where vegetables and farm products are sold offer honey, sometimes from several different farms. The turnover is good in the chain stores and delicatessens, and recently it was offered in the five and tens at twenty-five cents per comb, where it was literally "gobbled up."

The average of seventeen honey analyses made in the government laboratories show a water content of 18.2 per cent; protein, .4 per cent; carbohydrates, 81.2 per cent, and .2 per cent ash. It is interesting that this analysis gives average honey a fuel value of 1520 calories per pound, which is higher than white bread, cream pie, all fresh fruits, top sirloin or rib beef, eggs, chicken or turkey.

Let us go back to the hive for a moment to consider the wax. The honeycomb of beeswax is known to all of us, for there is no such thing as unextracted honey without it. Honeycomb wax is one thing man has never been able to imitate.

The waxen cells of the comb are used not only for honey storage but as nurseries as well. As bees will hoard food material, convenient boxes of uniform size are placed in the top of the hives above the larger brood combs. In each box a sheet of wax "foundation" is fastened and upon these the bees construct their excess combs and store them with honey. These, of course, are the little boxes that we buy for home consumption.

If you examine a comb closely, before the bees have filled and capped it, you will notice that the cells, long supposed to be of hexagonal form, are really round and the filled in wax spaces inevitably produce this six-sided illusion.

The wax itself is secreted by the bees in special glands on the under side of the body. This is removed, masticated, and thus mixed with the solution of their salivary glands, and it is then ready to be moulded into a comb.

The chief ingredients of beeswax are cerotic acid and myricyl palmitate. It is just another combination of those all important elements, carbon, hydrogen and oxygen. It is quite harmless and may be eaten freely along with the comb if one is so inclined.

For years the author has been tasting honey from different sources and it is hard to decide just which one, from a known type of blossom, is the most pleasing. Goldenrod sometimes produces a very fine honey, as does basswood and clover. Some prefer the dark-colored buckwheat type. I pick the pure amber-colored honeys as the best, but this is my personal opinion only. Of all the amber varieties, that which comes from sumac is the best.

Ordinary honeybees are capable of producing most unusual honey if placed in a strange land away from their accustomed blossoms. In the island of Dominica, for instance, the author was introduced to a deep, reddish-brown type, with a flavor utterly unlike anything ever before encountered. Dr. Thalley, the owner of the bees, found that they were making it from logwood blossoms. While it seems that there could be no possible connection between the tree and the color of the resulting honey, it is an interesting coincidence that logwood contains a coloring principle much used in dyeing. It is possible that from cut or otherwise wounded trees the bees may have unwittingly dyed their honey from their habit of drinking any available sap.

Another famous dark honey is the heather honey of Europe. If produced in Scotland, it brings a high price. The heather of England makes a grade somewhat inferior and it is therefore cheaper. In southern Europe, the favorite is probably Romarin, which the bees make from the nectar of rosemary. From Greece comes the classically known "food for the Gods," made from blooming wild thyme and known as the honey of Mount Hymettus.

Doubtless you have observed that honey that has been extracted and placed in jars is sometimes very thick and completely clouded. This condition is called granulation and it comes from the fact that most honeys

crystallize after extraction. It does not denote adulteration.

Most ordinary types change to the crystallized state in about six months after bottling, but this may be hastened if the bottles are placed in an ice box. There are extreme cases also, such as white tupelo honey, which remains liquid after ten years, and the honey from blue-curl nectar, which granulates almost at once in the wax cells.

In the opinion of the author, crystallization greatly enhances the flavor. Many people agree upon this point. In France I noticed that a great proportion of the honey was sold or served in this state. In Italy I saw much of this, but in Switzerland clear honey was the rule although the other could always be obtained. I once found a nest in British Guiana, containing a minute amount of honey that had been made by a species of wasp. I had heard of poisonous honey from the jungle, but decided to take a chance, reasoning of course that nectar products would hurt no living thing. To my delight and surprise, this morsel was unlike anything I had ever tasted. I would like to match it against the honey of Mount Hymettus for it possessed the most distinctly floral taste of all, delicate as a fine perfume. The nest of this wasp was made of red paper and the honey, the first I had ever found in the home of these insects, was stored in a small mass in the dome of the nest.

Let me urge a wider use of honey. It is a great energy producer and should be considered from that standpoint in diets rather than as a tissue-maker, as it is of course low in protein. It is far less detrimental to the kidneys than plain sugar and it has been used with much success in the treatment of typhoid patients.

You can give it to the youngsters, too. It will ease that longing for sweets in a harmless way. It is necessary to acquire a taste in many cases, I admit, but once you really learn to like it, it becomes, like cheese that was once offensive, one of the true delights of good living.

•

The Vanishing Mountain Hau

By W. A. DUPUY

THE ONLY known tree of its kind in the United States, or in the world for that matter, is threatened with death. Forestry experts are waging a fight to preserve the sole remaining specimen of a tree growing near the eastern border of Hawaii National Park.

The only wild specimen of the rare tree ever found in recent times was discovered in 1911 by J. F. Rock and the late W. M. Giffard. It was named *Hibiscadelphus giffardianus* in honor of Mr. Giffard. Hawaiians call all members of this genus *Hau Kuahiwi*, meaning mountain hau. The tree is closely related to the widely distributed hibiscus group.

PAN-PACIFIC PRESS BUREAU PHOTOGRAPH

THE LAST TREE OF ITS KIND

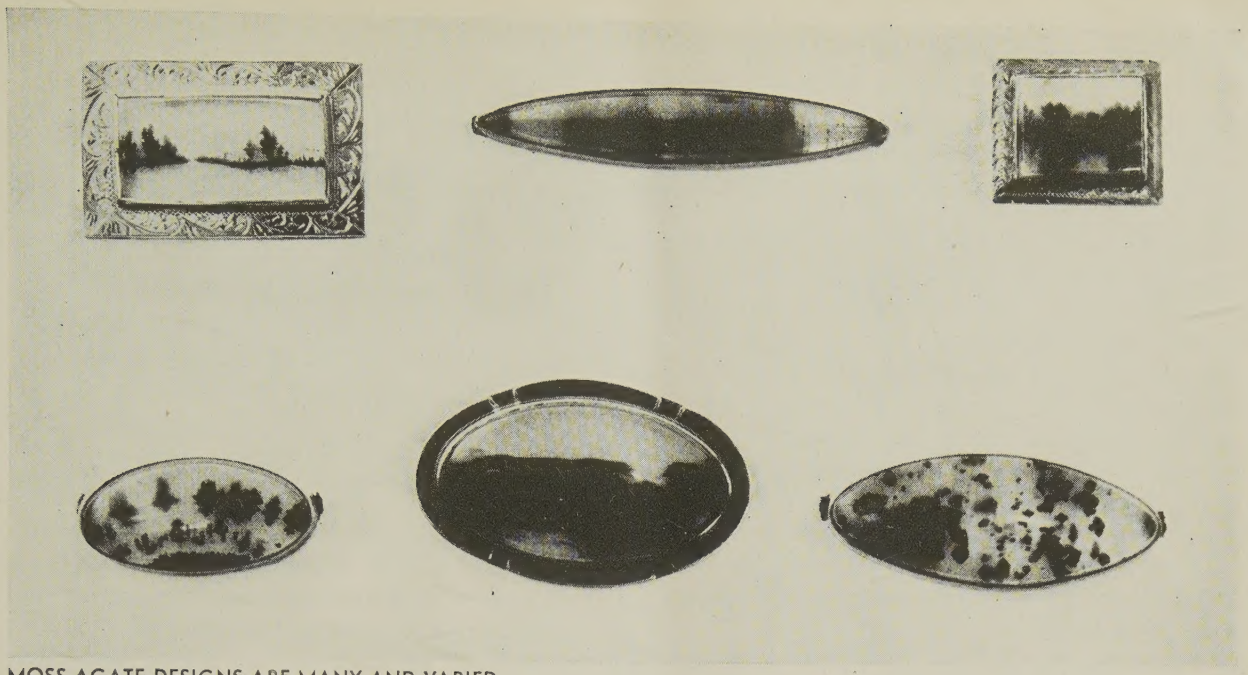
The only known specimen of mountain hau in Hawaii has enlisted the care of experts to keep it from dying

Seed from the wild tree was secured and Mr. Giffard raised a number of seedlings, which he planted near the National Park at an altitude of about 3900 feet. Only one survived, the lone tree that is now threatened with death.

Efforts were also made to preserve the wild tree found on the slopes of Mauna Loa in an area now included in the Park domain. In spite of all efforts, it died in 1930.

Property upon which the Giffard tree is growing was secured several years ago by Mr. James Henderson of Hilo, Hawaii. Realizing the importance of the rare tree on his property he called in all available forestry experts in an attempt to propagate the plant. Many methods of propagation were tried but without success. While the experts have not given up hope they are not so confident of success as they were at the start of their work. At present the tree is sickly. It has recently suffered a severe attack from insects, lessening still further its diminishing vitality.

If the lone tree dies it means the end of another plant species in this part of the United States. The sandalwood trees that covered the mountains of Hawaii years ago have only a few remaining representatives today, because of the inroads made many years ago when the sandalwood trade with China was at its height. The great koa tree of Hawaii also faced extinction until governmental efforts resulted in the establishment of protected areas. Hawaii is waging a constant fight to retain its lovely native flora.



MOSS AGATE DESIGNS ARE MANY AND VARIED

These specimens have been cut into brooches. Note the striking similarity to a snow-covered countryside in the upper left agate. Photographs on this page courtesy of Larimer's Agate Shop, Glendive, Montana

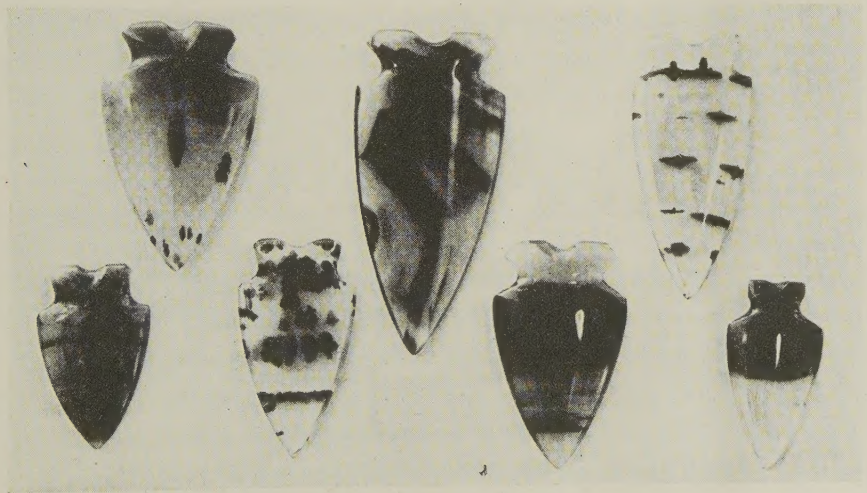
The Mystery of the Moss Agate *By* JOSEPH W. HOWARD

Most of us received our first introduction to agates when, as children, we purchased our "aggie" marbles. If we had investigated further we would have found that had the stones from which these marbles were carved, been cut, instead, so as to expose a flat surface, this surface would have resembled a ribbon, eye, ring, rod, ruin or fortification. Going one more step in our search we would have discovered that Nature was not content to make agates with only these types of contours, but had formed some with still more fanciful figures. These figures often resemble moss, trees, bits of vegetation, skyline scenes, islands in minute lakes, bridges, birds or profiles. To this variety has been given the name moss agate or dendrite. To a limited number of these, another exquisite touch has been added by making a small prism part of the body of the stone. Such a specimen on being held toward the sunlight and moved up and down displays the colors of the rainbow.

The method used by Nature to produce the moss agate is a matter for conjecture. Chemical analysis has made it clear that the figures are not entrapped fragments of animal or vegetable life. In fact they have no more connection with these types of life than do the frost figures on a window. If they were from such sources, they would be composed of organic compounds. But they have been found to be minerals. The black comes from oxide of manganese. The reds, greens and blues result from compounds of iron, copper and nickel respectively.

A plausible explanation of their mode of formation is that cavities in volcanic rock were filled with a silica jelly. When partially dry odd-shaped cracks resulted. These cracks were then filled with the various colored minerals mentioned. In some cases the final sealing of the openings was done with more silica.

Another theory has gained considerable credence because an effect similar to that found in the moss agate can be produced by the chemist in his laboratory. If a crystal of a colored salt is dropped into a dilute solution of



INDIAN ARROWHEADS CUT FROM MONTANA AGATES

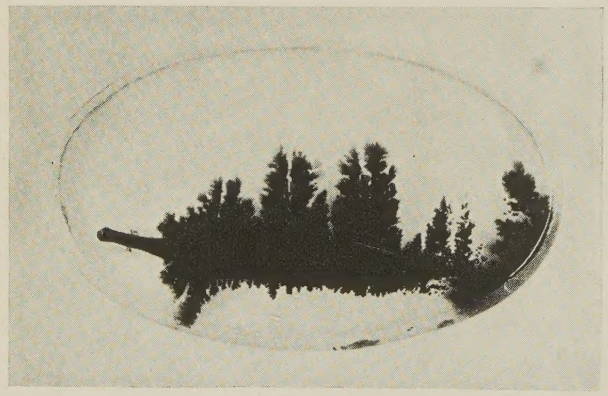
This state is particularly favored with agate deposits along the Yellowstone River

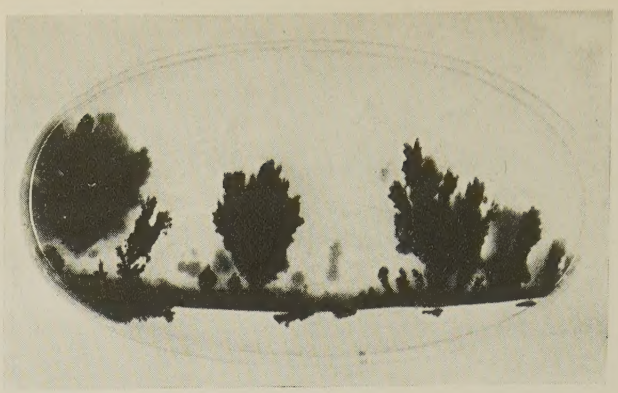
water glass, it dissolves in the water and then reacts with the water glass forming a little sack. In a short time this sack swells and bursts, expanding upward into a tree-like growth. Several such figures give the whole the appearance of a "submarine garden". Perhaps a similar process took place in the first stages of moss agate formation.

After the agate had hardened thoroughly, weather forces wore away the softer surrounding rock and ultimately carried the agate considerable distances from the place of its formation.

The chief states in America that have been favored with deposits of these stones are Montana, Wyoming, Utah, Colorado, Texas and Oregon. That section of the Yellowstone River between Billings and Sidney, Montana, has been especially blessed. The agate cutters of this region often combine business with pleasure by making a boat trip down this river, searching the banks and gravel bars for specimens. The outgoing ice and following spring floods aid periodically in bringing a new crop to the surface. One collector reports as his best find a gravel bed yielding twenty pounds of moss agates to the acre. Individual specimens generally weigh less than four pounds, although a single agate weighing as much as twenty-three pounds has been found.

There is nothing on the surface of a rough moss agate to give a suggestion of its hidden beauties. In fact it looks dull and is often lined with the marks of the cavity in which it was formed. A few pieces of chalky or other rock may be adhering to the surface. Yet to the experienced hunter it is readily recognizable among other rocks. Some prefer to hunt for them in the evening, as sufficient light from the setting sun penetrates the moss agate to make it more visible than earlier in the day.





EXAMPLES OF AGATE LANDSCAPES

Above, the "growths" appear like giant prehistoric ferns. Below, fir trees are mirrored in an agate lake. Photographs courtesy R. L. Harris, Miles City, Montana

A moss agate cutter should be an artistic craftsman. The mechanical work of cutting must be perfectly done and the individual settings must be made so that the figures in them will show to the best advantage.

The stone has a grain similar to that of wood and splits best length-wise with the figures. Occasionally the figure itself is cut into and if the coloring matter is loosely packed in the silica it will brush off like so much dust. The rough stone is first cut into slabs and these in turn into blocks having the individual figures. For this work the cutter prefers a circular saw of copper with a mixture of diamond dust and vaseline carefully packed into the notches. A soft annealed-steel disk saw charged with a creamy mixture of carborundum and water may also be used. The agate must be firmly clamped and care taken that during the cutting pieces do not break off and wedge into the saw.

The further shaping and rounding of the individual blocks are done on a carborundum wheel and a sander of carborundum cloth. The final polishing is accomplished with tin oxide putty powder and felt buff lapping. Agate takes a brilliant and durable polish.

The moss agate is used chiefly for decorative jewelry. The fact that no two are exactly alike enhances its value for this purpose. Very effective lamp shades have been made from small slices of agate. These were fitted together by the same method that is used in making leaded glass windows.

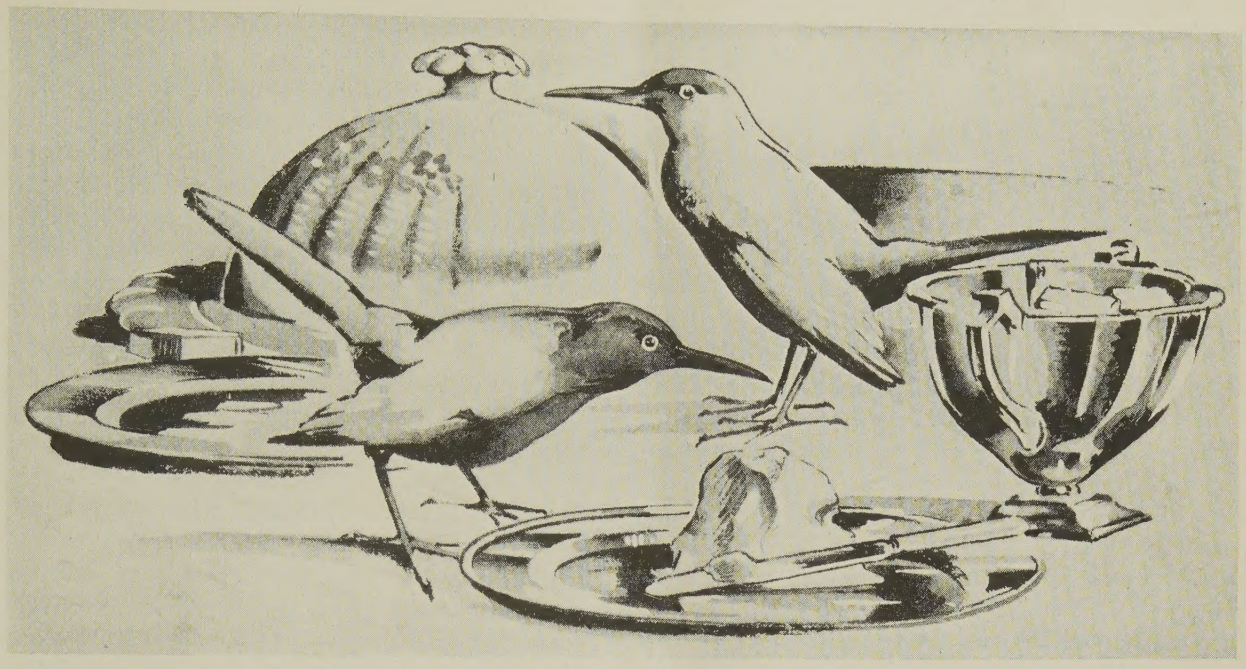
Although the world has produced many famous painters of scenes from Nature, none has surpassed some of the paintings by Nature herself in the moss agate.

•

Beginning with the October issue and continuing for three successive numbers, we are presenting, in the rotogravure section, a series of articles on weather phenomena by the late Charles Fitzhugh Talman, well known as an authority on this subject. The first of the series is concerned with tornadoes, and "close-ups" of Nature's mightiest winds as they have occurred in various parts of the world are shown. "Atmospheric Optics" and "The Versatility of Ice" will be discussed in the next two issues.

Three Meals Per Day

By STEPHEN HAWEIS



BIRDS OF MOUNT JOY, DOMINICA, HAVE FOUND UTOPIA

Breakfast of orange juice, toast, bacon and eggs is usual fare; and what a hubbub if it isn't served on time!

THERE IS, in the interior of Dominica, a house surrounded by verandas and situated in a lovely garden among the foothills of Morne Trois Pitons. For at least ten years the birds of the neighborhood have regarded the place as a sanctuary and restaurant, but while many are guests, certain birds have formed themselves into a close club to which they would willingly refuse all visitors. At times there have been regrettable accidents due to the presence of an old and privileged cat inherited from former owners, but that enemy is now no more. He was tried and condemned to suffer the extreme penalty of the law for springing on my knee and clawing a little bird off the tea table, a Schlater's finch, a small black velvet bird with a rusty red necktie and eyebrows to match. His wife is not unlike a great many other little birds, being of a nondescript olive brown color. She does not go in for ostentation. Since the cat has gone, the birds have realized that accidents must happen even in the best regulated sanctuaries and understand that although tea and toast are supplied regularly by the management, they do not hold themselves responsible for the entire safety of the club members. There have been no accidents for a long time and even the rare trembleur, a thrush that takes its name from a habit of vibrating its wings when alighted, has been elected, though not very willingly. Its bill is so long and strong that there was practically no argument.

Early tea is a national custom in the British West Indies, and all the birds know that small buttered crackers are served with it; that vast square lumps of sweet crystal live in a silver sugar-bowl upon a Chinese tray, and that milk is far better than water to drink. At about half-past seven they arrive upon the window-sill or back of a chair to wait for the maid, dodging out of the room where a guest may be still asleep to hurry around the house to the master's bedroom to see who will be the first to wake up. If the mosquito net is not down a visitor may waken to see a small feathered caller sitting on his toe, but if the net is used the birds possess their souls in patience as long as it is birdly possible and then fly screeching and butting at the net, obsessed by the conviction that the late-coming tray has been secreted under the bed-clothes. Occasionally a visitor does not care for tea so early in the morning. The birds do not approve of this irregularity at all; they sit on the side table and sometimes use the most regrettable language. I understand it, but fortunately visitors do not. They listen unconcerned to the most awful insults, merely observing that they are "too sweet."

I, however, don't like to hear them because, well, there is a technique to be observed even by the most privileged of social parasites. It is not good to forget the difference between a right and a privilege. On the other hand, temptation must be considered, for it can be quite a serious matter for the birds. If they choose the wrong room they get no breakfast; or if, realizing the horrible truth too late, they hurry away to one of the other rooms, all the crackers may be eaten, the milk too far down to reach and as for the sugar—there are children in the house who sometimes pay early morning calls. If the party is dressing it isn't easy to get to the tray, and if he has gone he may not have remembered to break a lump of sugar, and

a whole lump is a heavy load to carry from the bed to the jasmine bush outside. The next chance is breakfast. Do you imagine the hardy planter, weather-tanned, his battered topee casting a deep purple shadow across his scarlet face, his large boots and gaiters, and an impatient horse tossing its head beside the old-fashioned post with its stone mounting step, black Sambo holding the large glass of vitriol-and-soda for his morning snack? If you do, you are thinking of the wrong place—nothing of the sort happens at Sylvania. The first breakfast bell wakens the household, the second makes us realize that it is really time to make a move. At the third the Schlater's finches begin to screech and the trembleurs leap in all directions watching the indigestible china and silver upon the colored linen tablecloth with anxiety. If the butter is on the table it is a good day but the maids have developed a habit of not bringing it until at least one is seated at the table. "Dark kimono" comes first, and "shirt-and-shorts" is generally next. Presently "tussore wrap" arrives with her lovely hair tied with a ribbon, but what can a bird do about it? Pieces of toast may come flying through the air, but that necessitates quick thinking, for Toby can swallow a whole bird-breakfast with one lick of his tongue. Dogs ought to follow the cat—not hang around when birds are hungry!

But this is peeking in through the jasmine. A private family has a right to its privacy—still, nobody knows how good scrambled eggs can be when pecked from between a knife and fork, and ah, how good the chips of bacon—better even than butter! It is possible but not quite safe to sit on the table when the Big People are eating: they have never injured anybody yet, but they do occasionally wave a teaspoon under your beak and drive you away.

Strangers are always astonished to see wild birds so tame and ornithologists let their coffee get cold watching the trembleurs' yellow-rimmed eyes and warm brown suits. They are rare birds that many naturalists have not seen except in the form of specimen skins. To us their chief interest is the fact that these particular birds have abandoned their natural habits almost completely. They have retired from business and never go out into the world to compete for their share of the grubs, seeds and fruits. A bite of orange on the tree is all very well, but bacon is better and orange juice out of a glass is better too—tastes sweeter somehow. After meals the club may fly for a little while or take a sun bath on the roof. Why wear out your feathers chasing bugs? Three meals are provided regularly; indeed, four; but the birds don't know that, for the last meal of the day takes place after their bedtime, and the table does not come out on to the veranda.

•

The New Zealand Apteryx

By EDITH M. LAING

In ages long past, New Zealand undoubtedly was part of a vast continent. When the land sank, the peaks became islands, and for further ages were completely isolated in the trackless wastes of the Pacific ocean.

The fauna of New Zealand offers an absorbing study in peculiarities developed through this prolonged isolation, and the absence of ground enemies.

The Polynesian seamen who once roamed the great Pacific in their remarkable sailing canoes, found in New Zealand a member of the ancient family of Apterygidæ. This was the kiwi, an awkward-looking cousin of the ostrich, emu and cassowary; with hair-like plumage, no tail, no wings, and most surprising of all, with nostrils in the tip end of its long, slender bill.

At night, its keen sense of smell aids it in the search for worms, grubs and berries. Its strange plumage was highly prized by the native Maoris for decorating their cloaks of finely woven flax.

Five species are known, but because of settlement, bush fires, and the stoats and weasels unfortunately introduced to battle the rabbits that also were imported, kiwis now survive only in the wildest bushlands.

Fortunately for the native birds that are now rapidly disappearing before the march of civilization, the Government has wisely established several sanctuaries.

Besides the kiwi on the stamp (enlarged), an example of the native *Cordyline australis* of the Lily family is shown. Because of the flavor of its delicate heart-leaves when cooked, the early New Zealanders named it the cabbage tree. Its white berries are greatly relished by the wood pigeons.

The groups of four stars are an adaptation of the Southern Cross as used on the flag of New Zealand. Believing that when a great chief died his eyes became stars, the Maoris call all brilliant stars the Eyes of the Kings.

The border design at each side is taken from the grotesquely carved images so popular with the Maoris. Note the three-fingered hands, and the protruding tongues; the latter indicating defiance.

To make sure that no space on the stamp was wasted, its designers used fern leaves freely. This is most appropriate, for New Zealand proudly boasts one hundred and sixty varieties of these ancient plants.

Where Do Birds Sleep?

By S. F. AARON

WHERE do winter birds roost at night? The zealous ornithologists generally have overlooked this matter. Not that a good work on birds necessarily need mention it; nevertheless if we inquire into the songs of birds, their mating, their nesting habits, their flights, we might as well know a few more things not a whit less intimate.

I was led to seek an answer to this question by chancing upon some juncos at roost in dense, snow-covered woodbine along a road bank. I saw the birds flocking there just at nightfall. There were many natural holes in the snow where it had failed entirely to cover the ivy and into these places the little juncos had gone. A wide and dense mass of tangled stems and leaves beneath the heavy crust allowed only such tiny creatures to enter, barring most of their seasonal enemies.

During the famous blizzard of 1899 I found a flock of juncos and tree sparrows roosting within a great mass of close-growing grape vines that spread over a dogwood. The tree was covered by a rapidly-increasing umbrella-like canopy of snow. No owls or weasels could reach those birds. When such combinations of snow and ivy are not handy it is not difficult to trace the birds to tufts of dense grass growing on southern sloping hillsides or to red juniper trees and bushes.

Densely-leafed vegetation is chosen as roosting places to shield most birds from a host of night-prowling enemies, rather than as shelters from cold. As a matter of fact many birds have little regard for low temperatures; it is the covering up of their food supply that drives them south. But the slender stems and leaves of grass tufts, ivy and evergreens serve as most excellent burglar alarms at night; the most silent prowler cannot penetrate such places without jarring the roost and instantly arousing the sleeping inmates who immediately dart out on the other side.

Perhaps one reason why owls often hunt in pairs is in anticipation of finding their intended victims in these retreats. One owl may explore the grass tufts, the other following the routed game to some new perch and seizing it before it can hide itself. I have observed some of the day-flying raptores so engaged after field mice. Cats, weasels and other four-footed enemies cannot follow the flight, but grimalkin, to offset this, leaps spread-legged upon the place where its nose has told it almost unerringly of the sleeper's exact location. I have seen a cat do this, but the bird escaped from beneath and to one side of the prowler; the leap in this case being too long. I imagine that frequently it is timed correctly and is followed by a downward, clawed blow that is sometimes successful.

Further to test this habit of choosing safe sleeping quarters I approached a grass tuft, and thrust the slender end of a long fishing-rod along the ground in the manner of a creeping snake. As the pole touched the grass tuft, out dashed the junco, flying to another tuft perhaps fifty feet away.

IN WINTER THE JUNCOS ROOSTED WITHIN THE IVY BENEATH A SNOW BANK

Observations of the roosting places of birds in general are most easily made when trees and bushes are leafless. I was once led to the flicker's place of retirement from its calling just before sunrise. On one occasion, as it grew dusk, I heard the monotonous call of the nuthatch all about me and the sharp, metallic chirp of a downy protesting my approach. Every one of the little hunters seemed contented and busy. Then—presto! The whole flock was gone. Where? I had made the mistake of trying to keep an eye on several birds at once. I was able to see only the downy streaking across the woods toward the distant corner.

One of the nuthatches seemed to fly upward and disappear into the sky. The third evening I made my observations in a drizzling rain in that corner of the woods about fifty feet from a giant white oak that was all but defunct. Many of its limbs and branches had rotted away, leaving holes and crannies in the great trunk. My hunch was good. As the light began to fade a downy woodpecker flew over the tops of the trees, followed presently by another and then a third. They went straight to the old oak and into some of the smaller of those many holes and crannies. I am still hoping to solve the riddle of the nuthatches.

The flickers quite accidentally made known to me that they roost in holes. It is well known that martins occupy their own boxes as well as old woodpecker holes at night; that bank, barn and tree swallows and chimney swifts use their nesting places also; that the phoebe seeks niches in stone and timbered walls; and the robin retires within evergreens and vine tangles. Bluebirds seek hollows in trees, often crowding in numbers into favorable crannies.

AT NIGHTFALL THE DOWNIES SOUGHT THE HOLES IN AN OLD OAK TREE ON THE EDGE OF THE WOODS

Then there are the summer residents, and much about them is yet unknown. We know that the orchard oriole finds shelter in dense deciduous growth. Thrashers and catbirds seek thickets of young trees. Doubtless, hidden away in the vast literature on the habits of our birds, there are many scattered notes on the subject, but we believe that much can yet be learned on the resting places of such birds as cuckoos, kingbirds, vireos, tanagers, warblers and many others. Do the high nesters sleep beside their homes and mates, or do they descend to the shelter of the thickets? There must be abundant conjecture, adventure, excitement of suspense and much real fun in learning these points. Go to it, you Nature lovers!

Cigar Orchids

By HUGO H. SCHRODER

AN AMAZING variety of plant growth is to be found in the state of Florida. Not only are there flowering plants of many kinds growing in the ground but strange epiphytic and parasitic plants fasten themselves to the bark of trees and grow on the trunk or on the branches far above it.

One of these epiphytes may well be called the cigar plant. This plant, with its peculiar cigar-like growths, is known only by the scientific name of *Cyrtopodium punctatum*. It is an orchid of tropical origin native in the southern part of the peninsula, where it may be found attached to trees. A number of large plants have been observed in the dense cypress swamps of the southern counties.

My first sight of this uncommon orchid was a specimen brought in from a cypress swamp. Only a part of the plant growth had been removed from the tree but the section cut from the original plant was more than a foot through. The base of the growth was a dense mass of intertwined roots. Several flower stalks were beginning to put in their appearance so I prevailed upon the owner of the plant to allow me to cut off a section and take it home for observation. There was one such flower stalk in the section I cut.

The plant was set up in the back yard and seemed to thrive without any attention whatever. These tree-growing orchids derive their sustenance from the air, and moisture supplied by dew and rain. Certain of the epiphytic orchids are provided with a number of pseudo-bulbs, which grow in various forms and sizes. *Cyrtopodium punctatum* has elongated pseudo-bulbs, shaped like a long cigar. The photograph shows a small plant with only a few leaves but having more than a half dozen pseudo-bulbs, most of which are large-sized. A dense

AN UNCOMMON PLANT

The cigar orchid attaches itself to tree trunks in the Big Cypress Swamp, Florida

mass of roots is seen at the base of the clinging plant.

The specimen kept for observation at my home sent up a flower stalk more than four feet long. This was covered with many greenish flowers, spotted with purplish-brown. The blossoms were more than one inch in diameter. The bracts were rather wavy and the slender leaves were few in number and from one to two feet in length.

Cyrtopodium punctatum is not a common plant anywhere in south Florida. When found in bloom at its natural home, this tropical orchid presents a most unusual sight for the Nature lover and student botanist.

FERNS

Their Life Story

By

S. JUDSON EWER

THE FIRST STAGES

At the left are fern prothalli or gametophytes, delicate green bodies no larger than one's little fingernail. At the right are young ferns at an early stage in life. The prothalli have withered and disappeared, leaving the tiny plants to live an independent existence

IMAGINE a woodland without ferns! What a drab and desolate place it would be! If we contemplate for a moment the possibility of a fernless world we cannot but realize how much of natural beauty depends upon this type of vegetation. It is the delicacy of ferns that creates so often the charm and loveliness of woodland vista, rocky gorge, or pasture hillside.

Thoreau once said, "Nature made a fern for pure leaves." Truly this seems to be the case, for it is the leaves or "fronds," as they are more popularly called, that make up the bulk of the plant and are closely associated in our minds with the word "fern." In all cases the leaves arise from stems, but in our native species these creep along the surface of the ground or are buried in the soil, and are thus inconspicuous. To the trained botanist their detailed study tells much concerning past history and evolution, but for the Nature lover they have little significance. Neither do the roots claim special attention. They are usually small, fibrous, and serve the plant as organs for support and the absorption of water and mineral salts from the soil.

For the Nature lover, then, the study of ferns is a study of leaves, and one soon learns how great is the variety among the different species. In spite of all diver-

THREE VARIETIES OF MATURE FERNS

Pictured left to right are the marginal shield fern, ***Thelypteris marginalis;*** the narrow-leaved spleenwort, ***Athyrium angustifolium;*** and the rock polypody, ***Polypodium virginianum.*** Note the "fruit dots" or sori in the first picture, typical for this group. In the center picture, the sori are numerous and elongated, and in the last the round "fruit dots" have no protective indusium

THE INTERRUPTED FERN

Osmunda claytoniana proves that it is well named. The dark, spore-bearing pinnae "interrupt" the fruiting fronds

sity, however, there is one characteristic they hold in common. Observe a developing frond in the garden, or better, go into the woods in the early spring when all vegetation is reviving from its winter rest, and see the young leaves pushing up into the warm sunshine. Each has, at first, the form of a bishop's crosier, that, as it develops, progressively unrolls from base to tip. The "crosiers" vary in size and shape among the different species, and in the larger forms, such as the osmundas or "flowering" ferns, they are commonly called "fiddle-heads" or "fiddle-necks."

The mature fronds vary greatly. They may be entire as in the walking fern, *Camptosorus rhizophyllus,* or compound and much divided as in the hay-scented fern, *Dennstaedtia punctilobula.* When compound, the leaflets are known as pinnae, and if the pinnae are still further compounded the smaller divisions are called pinnules. The leaf-stalk is termed the rachis and corresponds to the petiole of ordinary leaves. Fronds may be tough and leathery as are those of the purple cliff-brake, *Pellaea atropurpurea,* or they may be delicate and feathery as in the maiden-hair, *Adiantum pedatum,* and many of the spleenworts. In size there is variation from the minute leaves of the tiny water-ferns to the gigantic ten- and twelve-foot fronds of certain tree-ferns.

In general, fern fronds serve the plant in two capacities. Being green and having a typical leaf structure, they manufacture food and carry on transpiration and respiratory processes as do the leaves of flowering plants. Other than these functions, that may be designated as purely vegetative, fronds take part in reproduction and bear the spores. Sometimes, as in the genus *Asplenium,* vegetative and reproductive functions are carried on by the same leaf; sometimes there is a division of labor, and certain leaves only bear the spores while others upon the same plant carry on the vegetative processes. This latter condition is characteristic of the cinnamon fern, *Osmunda cinnamomea.* In certain species the fronds are partially spore-bearing and partially sterile. In the interrupted fern, *Osmunda claytoniana,* for example, there are a few spore-bearing pinnae in the middle part of the frond, those above and below being green and vegetative. The royal fern, *Osmunda regalis,* has normally its uppermost pinnae spore-bearing or fertile while those below are vegetative or sterile, but, if one examines carefully, pinnae may often be found that show a transition between the two conditions and are themselves partially fertile and partially sterile. In the Christmas fern, *Polystichum acrostichoides,* the spores are borne at the tip of the long tapering frond, the lower and broader portion being entirely sterile. In some ferns the fertile frond is so entirely different from the sterile that there is scarcely anything in common between the two and it is difficult to believe that the spore-bearing portion is really derived from a leaf at all. Such a condition may be seen in the common sensitive fern, *Onoclea sensibilis;* the ostrich fern, *Pteretis nodulosa,* or in those peculiar forms, the moonworts, *Botrychium,* and the adder's tongue, *Ophioglossum.* The manner of spore production, as exhibited in the varied types of fertile fronds, is an extreme-

A WOODLAND BEAUTY

The spinulose wood fern, ***Thelypteris spinulosa,*** lends a distinct charm to our northern woods. This fern is gathered in quantity for commercial purposes

ABUNDANT IN OPEN FIELDS

The hay-scented fern, ***Dennstaedtia punctilobula,*** is abundant in open, dry pastures where it grows near boulders, or banks itself along stone walls

ly important point for the determination of the different fern groups and for the identification of species within these groups.

By the uninitiated, spores are sometimes called seeds, and yet a spore and a seed are so different as to warrant no just comparison. Both serve to reproduce the plant, it is true, but a seed is a complex, many-celled structure containing a very minute embryo plant; a spore, on the other hand, has only a single cell and contains within it no hint of what may be produced upon its germination. Both give rise to new plants, but from the seed comes a plant like the parent upon which it was borne; from the fern spore comes a tiny plant in no way resembling the leafy fern plant.

A fern spore is so minute that it is scarcely visible to the naked eye and appears as a particle of fine dust. If one touches a fertile frond when the spores are mature and shedding, little clouds of dust drift away like smoke. Millions of spores are being sent forth to be scattered over the countryside. Few survive, however, else our whole earth would soon become a gigantic fern garden.

Spores are produced in tiny cases known as sporangia, and these are usually aggregated into small groups or clusters—the "fruit dots" or sori. Sometimes, as in the tropical genus *Marattia,* a single sporangium may produce as many as eight thousand spores. In our native ferns, however, the number is usually limited to sixty-four or less, but even at this low figure when one considers how many sporangia are clustered into a single fruit dot and the number of these dots upon a single frond, one begins to realize the tremendous quantity of spores produced by a single plant. I counted recently the fruit dots upon a small frond of the common rock polypody, *Polypodium virginianum,* and found the number to be one hundred and seventy-seven. The blade part of this frond was but five and one-half inches in length and of this only the upper three inches bore sori. Estimating thirty sporangia per sorus and sixty-four spores per sporangium one obtains a possible total of three hundred and thirty-nine thousand, eight hundred and forty spores as the output for this single leaf! And for many ferns this would be a low estimate.

The fruit dot or sorus is, in some species, covered at first by a protective flap, the indusium, and the shape of this, be it round, kidney-shaped, or elongated, is an important point for identification. The characteristics of the fruit dots may be determined by the naked eye or with the aid of a hand lens; studies of the spores or sporangia may be made with a high-powered binocular or microscope.

When the spores are mature the indusia (if present)

THE FERTILE FRONDS OF THE OSTRICH FERN

The pinnae of ***Pteretis nodulosa*** are firm, thick and dark brown in color and bear no similarity to the waist-high, broad and pale green sterile fronds

wither, and during dry weather the sporangia break open, their walls bend backward, and then fly forward with a snap, scattering the spores into the air. If the spores alight in places where moisture and temperature conditions are favorable, they germinate and inaugurate a new phase in the life history of the fern plant. In the laboratory they have been germinated artificially in various ways: upon nutrient solutions (such as Knop's, Prantl's, or Sach's), upon gelatine (agar) media containing nutrients, upon moist soil, the surface of flower pots, or even upon water. In all cases the materials used must be thoroughly sterilized to prevent contamination by molds, bacteria and other foreign growths.

The spores, upon germination, give rise to small green structures, more or less filamentous at first, but later assuming a generally heart-shaped appearance, each with a tiny notch at the upper end. These bodies are known technically as prothalli (singular prothallus) or gametophytes. Under natural conditions a prothallus lives but a short time and does not grow larger than one's little finger nail. Under controlled conditions in the laboratory, however, prothalli of the ostrich fern, *Pteretis nodulosa,* have been known to live for four years and attain to a diameter of over four inches. But no matter how small each prothallus may be, it acts as an independent little plant, makes its own food, lives its own life, and is essential for the completion of the fern's life story.

The body of the prothallus is extremely delicate—in fact it is but one cell layer in thickness except at the center—and thus can live and mature only when there is an unfailing supply of moisture. Delicate hairs known as rhizoids, extending from the lower surface, absorb water and mineral salts from the soil and also anchor the tiny plant. Upon the under side also there are minute projections in which are produced the sexual cells or gametes. Since both male and female gametes are present these microscopic structures are of two kinds. If the prothallus is young and, perhaps, has not attained to its full size and heart-shaped appearance, one may look for the organs producing the male gametes or sperms. Each sperm-producing organ is called an antheridium and consists of a little globose case the lid of which opens at maturity and allows the sperms to escape. If these escape into a film of water they swim rapidly by means of many tiny whip-lashes.

Upon the older and more fully matured prothalli the organs containing the female gametes or eggs are found. These egg-containers are known as archegonia. They are larger and usually less numerous than the antheridia. Each consists of a little bulbous base sunken in the prothallus and a protruding "neck." In the base is a single egg. When the archegonia are mature the necks open and allow the sperms to enter. The union of a sperm with an egg is called fertilization, and with this act there begins a new fern generation. From the fertilized egg there gradually develops, by various embryonic stages, a new leafy fern plant. At first this tiny new plant derives its nourishment from the mother prothallus, but as soon as a leaf expands to the light and a root penetrates the soil, it is independent, and the prothallus that supported it withers and dies. Larger and larger grows the fernlet, until at last, after a few years, it becomes the beautiful fern of our woodland.

Thus it is that the fern life story swings in a grand cycle: the leafy plant produces spores and from these the small gamete-bearing plants arise. These in their turn give rise to the male and female cells that unite in the act of fertilization and bring a new spore-bearing generation into being. In our walks and rambles we see and admire the latter; but rarely do we notice or even take into consideration the tiny and delicate green prothalli that lie close to the ground, and unobserved carry out the alternate phase of the story. Scarcely one person among many who admire ferns knows how they come into being.

The White Clintonia

By EDDIE W WILSON

A LOVER of cool, rich, moist woods and dense shade is the White Clintonia or *Clintonia borealis.* Its range extends from Maine, south to Georgia, and west to Minnesota. And in certain sections of this territory in late June and early July one may find this attractive plant with its large, shiny, light green leaves and its slender flower stalk which bears from three to six cream colored flowers.

Then, if one will return to the woods for a look at the plant in the latter part of August, he will find that the dainty flowers have been superseded by handsome blue berries.

This lovely member of the Lily family was named in honor of De Witt Clinton, American naturalist, statesman, governor of the state of New York, and promoter of the Erie Canal project.

White Clintonias make pleasing additions to any wild flower garden, but when transplanted they require conditions similar to their native habitat: shade, moisture, and rich soil.

THE NATURE PICTURE OF THE MONTH

This is only September but it is not too soon to give thought to winter feeding of birds. Whether they be the song birds, or those who have the misfortune to be classed as game, our feathered friends need the help of man in winter. In many places, civilization has destroyed the normal sources of bird food, and we should make good this lack by winter feeding.

In this picture, chosen as the Nature Picture of the Month, we see a flock of California quail that are well-fed and healthy. This photograph was taken by Pete Bandera of Carson, Nevada. It was sent in by Katherine Lewers, who has a ranch of eight hundred acres in the Sierra near Carson. In sending the picture she says that she has fed the birds from October to May for many years, the quail hatching their young in the lilac hedge near the feeding place. No bird or mammal is ever killed on the Lewers ranch and they make it a sanctuary.

With the publication of this "Nature Picture of the Month" we discontinue, temporarily at least, the making of special awards. So many splendid pictures were submitted that selection of one outstanding offering was difficult, if not, in a measure, unfair. Under the circumstances it seems more equitable to invite the submission of pictures for purchase and use in the Rotogravure section, all on an equal basis.

Pictures submitted should be of a size not less than five by seven, glossy prints, carefully and positively identified as to subject and place where the picture was taken. Any interesting or pertinent information should be included for the purpose of caption material. The Rotogravure Editor is particularly interested in groups of related pictures that show the life habits of birds, mammals, insects, or other forms of Nature. Also groups of related pictures representative of the flora or fauna of a given region are preferred to random and unrelated pictures. However, individual pictures will frequently be acquired to make up related groups.

FUNGI

Learn which are edible

Photographs by L. W. Brownell

Since earliest historic times fungi have been of interest to man. Certain edible species furnish food to man and other animals. Others cause illness and even death. Their most important and widespread function, however, is in aiding in the disintegration of dead plants and animals, and their conversion into fertile soil. Were it not for fungi, the earth in a short time would be cluttered deeply with dead remains, if, indeed, life under such conditions could exist.

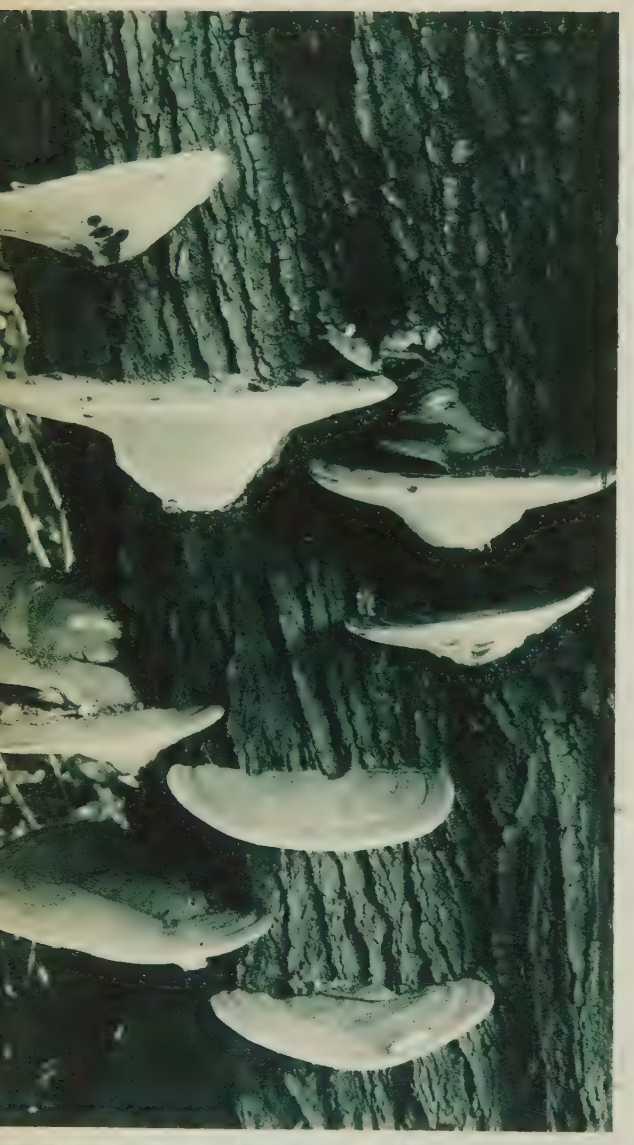
This crowded mass at the base of the tree is the honey mushroom, ***Armillaria mellea,*** one of the most deadly enemies of trees, especially of the oaks. The common name has reference to the yellowish color, not to the taste, which is acrid. The species is edible, but parboiling is necessary to remove the disagreeable taste.

The bear's head mushroom, ***Hydnum caput-ursi,*** grows in summer or autumn on dead or decaying deciduous trees; oaks and beeches are especially affected. The plant is white, becoming yellowish with age. In common with other species of ***Hydnum,*** this kind is edible, but some are so beautiful in their crystal whiteness that it is recommended they be reserved to feast the eye.

On this fallen log are growing many plants of *Pleurotus ulmarius,* so named from its preference for the elm. It is recognized by foreigners as edible, since it closely resembles certain European species, and is in demand.

Beside it is the jack-o'-lantern, *Clitocybe illudens,* whose beautiful yellow or orange hue, and its property of phosphorescence, make it attractive to the eye. However, it causes nausea if eaten and is classed as unwholesome rather than poisonous.

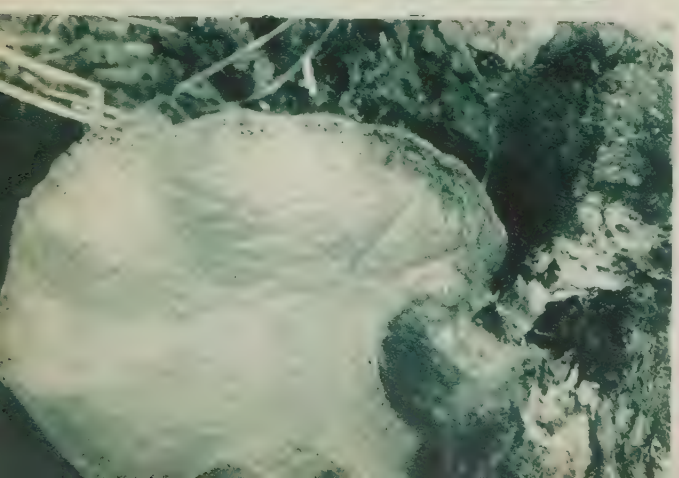
Pleurotus corticatus, belonging to a genus whose larger species are rather uniformly edible, is considered edible when in its prime and freshly gathered. However, it is a rather rare species.

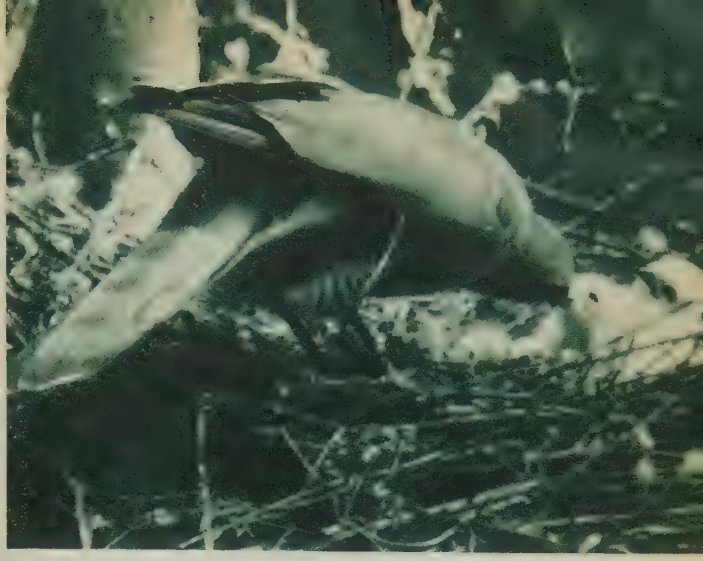


Above are two mushrooms that are edible. Massed on the fallen log are hundreds of the pear-shaped puffball, *Lycoperdon pyriforme. Polyporus sulphureus,* growing in flattened discs, called from its taste chicken mushroom, is also excellent when young.

These brackets, *Fomes applanatus,* spread their horizontal shelves on the trunks of various trees. They add a layer of growth each year and may reach a foot or more in diameter. It is scarcely necessary to say that these woody growths are inedible.

Below are two common species. The beefsteak mushroom, *Fistulina hepatica,* usually found on stumps of oak or chestnut, is a favorite for the table. At the right is shown *Schizophyllum commune,* beautiful but inedible.



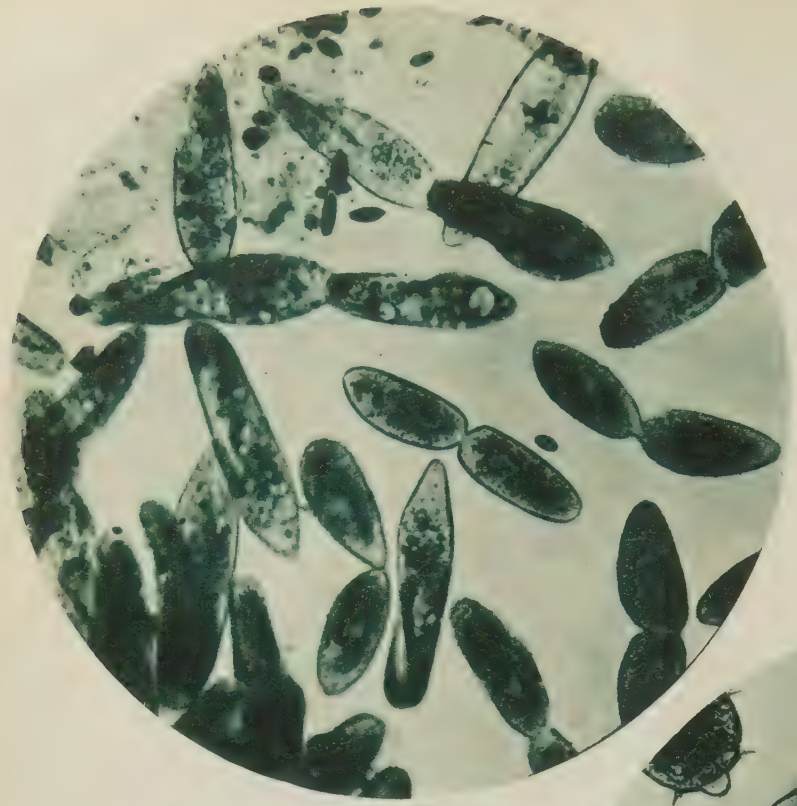


The European Sparrow hawk, wide ranging in Eurasia, has habits similar to those of the sharp-shinned hawk of America. The birds here shown were photographed by Gunnar Granberg of Helsingfors, Finland.

Beginning at the upper left the pictures form a nearly continuous series. First the pair is repairing the nest. Next is shown the nest some weeks later, at feeding time, when the parents are bringing in the results of their hunting. Then is shown a close up of the nest when the actual hatching is taking place. The last picture shows the young birds nearly ready to face the world, depending on their own resources.

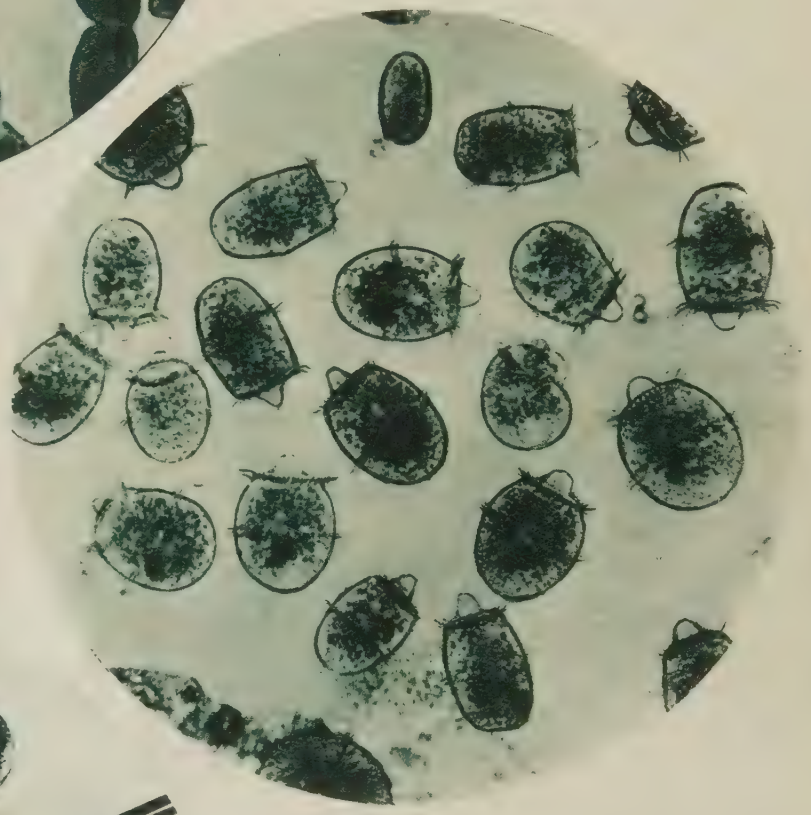
How Protozoans Live

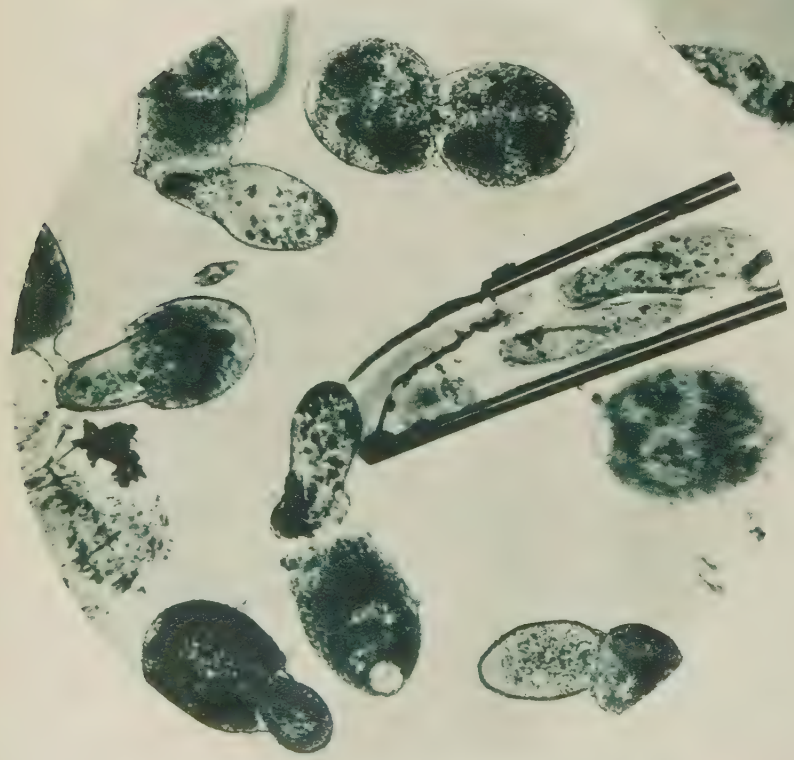
The Rosenwald Museum of Science and Industry of Chicago hopes to establish America's first Microvivarium. By methods that have been in use in Germany for some years, Dr. Georg Rommert, of the Biological Laboratory in Munich, and of Columbia University in New York, plans to make available to teachers and students these latest developments in the field of microbiology. On a four-foot screen these creatures that occur by hundreds in a tiny drop of water illustrate their astonishing activities.



Above is seen *Paramecium caudatum,* slipper animalcule, in its interesting process of division, by which it reproduces. In life these creatures measure about one-sixtieth of an inch in length.

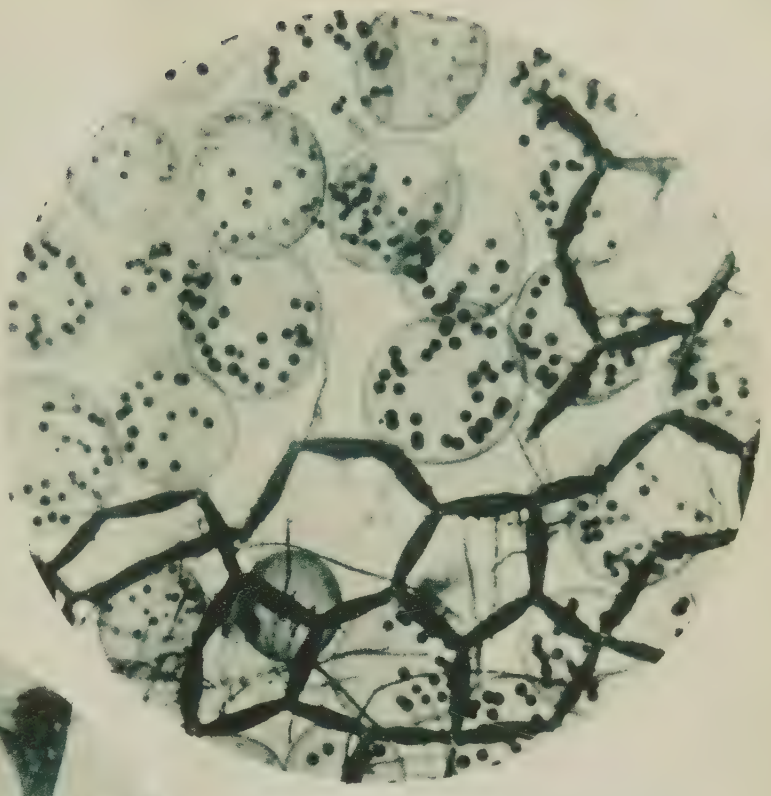
At the right is *Didinium nasutum.* Cilia enable them to move about. These organisms prey on the paramecium, whose powers of increase are thus severely taxed. The "law of the jungle" is well exemplified in the world of protozoology.

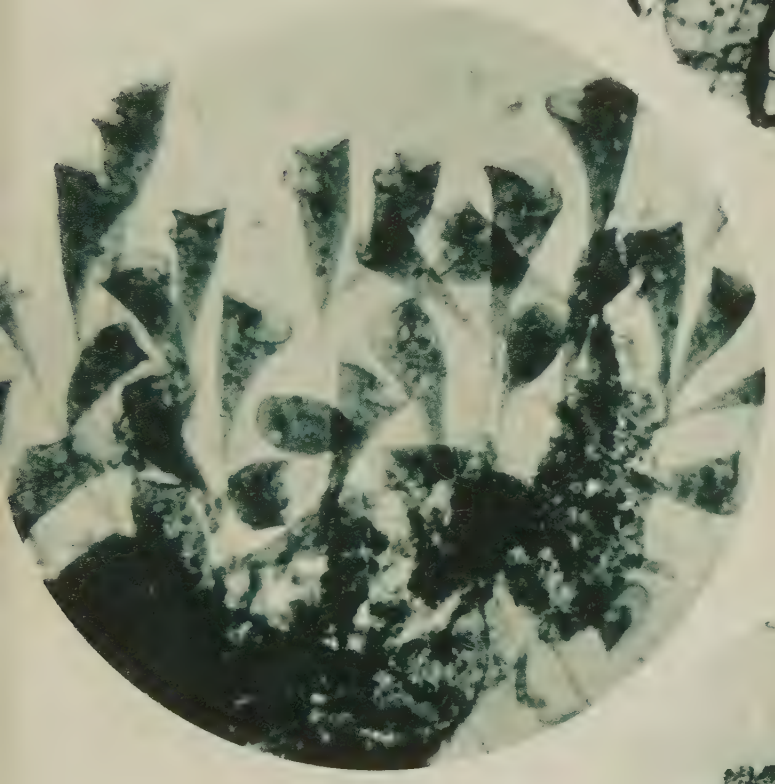




To illustrate the methods of attack some hapless paramecia are poured from a glass tube among a number of their enemies. Instantly the didiniums pounce on their prey, seeking to kill them by darting out the paralyzing tongue-like organ from the cytopharynx. But the paramecia are not altogether helpless. They seek defense by discharging swarms of trichocysts, like tiny spines, that may destroy the assailing "tongue." If this defense fails the slipper animal is engulfed by its adversary.

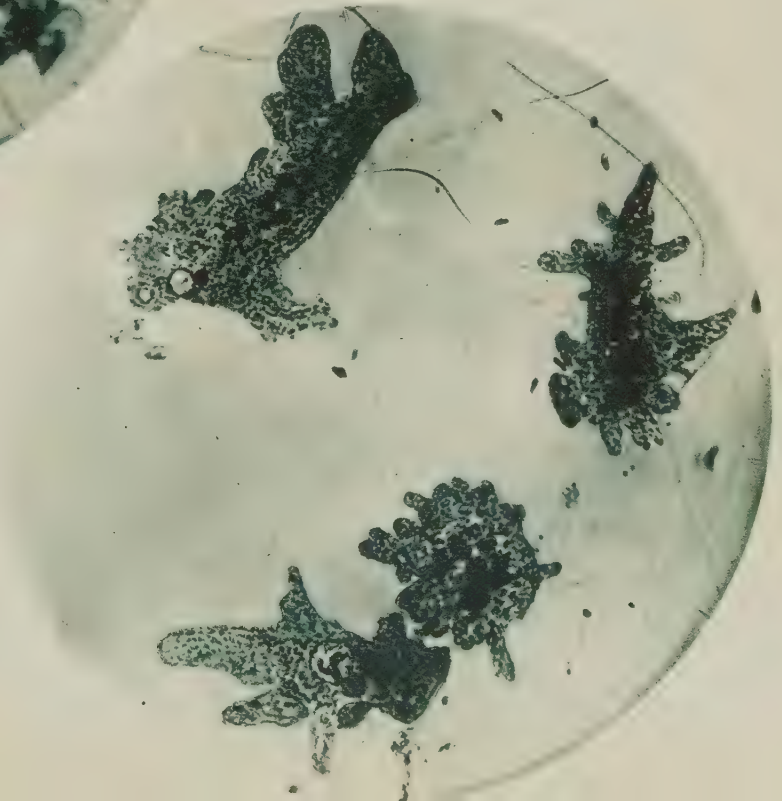
Here is shown a colony of flagellates, *Volvox minor,* sometimes called "ball alga." The walls of these emerald green balls are comprised of thousands of tiny creatures that are connected by protoplasmic bridges. Each individual is provided with a pair of whip-like appendages that are worked like a pair of oars, and by the rhythmic action of these, the ball is propelled. The dark spots are six-cells.





Stentor coeruleus, sometimes called the trumpet animal, is a deep blue green protozoan. Its body is covered with cilia that enable it to swim about singly, or help it to join its associates in beautiful groups such as are shown here. A spiral of cilia about the larger end helps to create a swirl that leads even tinier organisms into stentor's mouth.

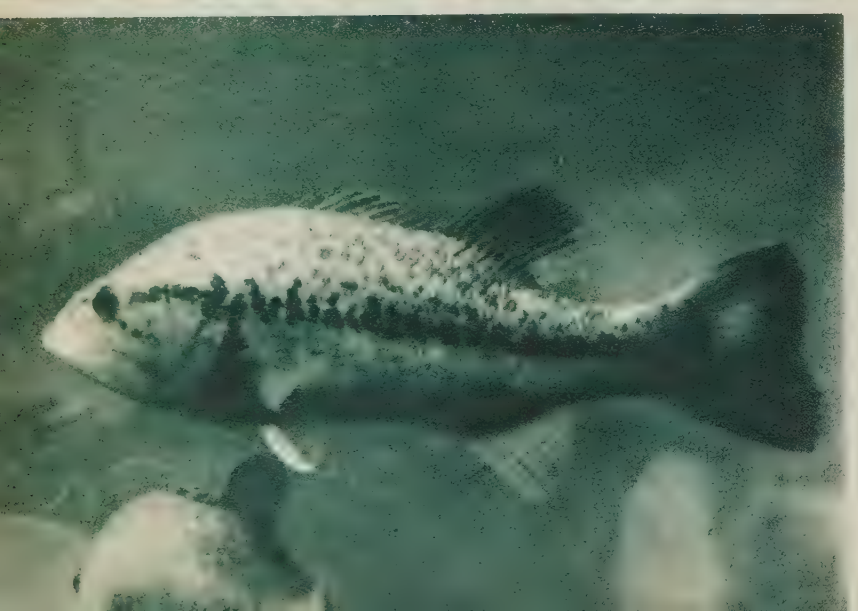
Amoeba proteus, here many times enlarged, is a tiny lump of grayish jelly, transparent as glass. It has no separate organs for breathing, eating or excreting, so these functions are carried on by any part of its surface. To eat, amoeba merely surrounds its food with its body. Reproduction is by division or fission.



On this page we present pictures of four of our better known fishes, taken by Arthur H. Fisher of Washington, D. C. The northern pike, pictured above, inhabits the northern parts of North America and Eurasia. This voracious fish, known as "water wolf," rivals the muskellunge itself in size and weight. It well exemplifies the law of the survival of the fittest. Broadly speaking, its food is anything that is alive and small enough to be swallowed, even to its own species. Young waterfowl and other waterbirds, and the smaller aquatic mammals, also help to nourish the pike.

The brook trout, at the right, is probably our best known trout. Originally mainly eastern in range, it has been widely introduced into western waters for sport purposes. It is dark above, with brown vermiculations, spotted on the sides, usually with red, and may be distinguished from our other species by the white or creamy border of the ventral fins.

The rainbow trout, whose name reflects its brilliant coloring, originally occupied the place in the mountain brooks of the West that the lovely brook trout filled in the East. Like it, also, the rainbow has been widely transplanted elsewhere, and its original range has also been invaded by others.



Originally confined to Atlantic Coast waters, the large-mouthed black bass, in obedience to the demands of sport, has been planted far and wide over the country. It is more tolerant of warm water than the trouts, but is sometimes put in real trout environment to the disadvantage of the latter, for smaller fishes form a considerable part of the food of the bass.

WILD FRUITS

Photographically presented on this and the next two pages by L. W. Brownell are the fruits of various wild plants. Above is the fruit of the sow thistle, a weed widespread throughout northern United States and southern Canada. It was introduced from Europe and is most troublesome in the grain sections of the Northwest, Manitoba and Saskatchewan. Sow thistle can be controlled by frequent mowing to prevent seed formation.

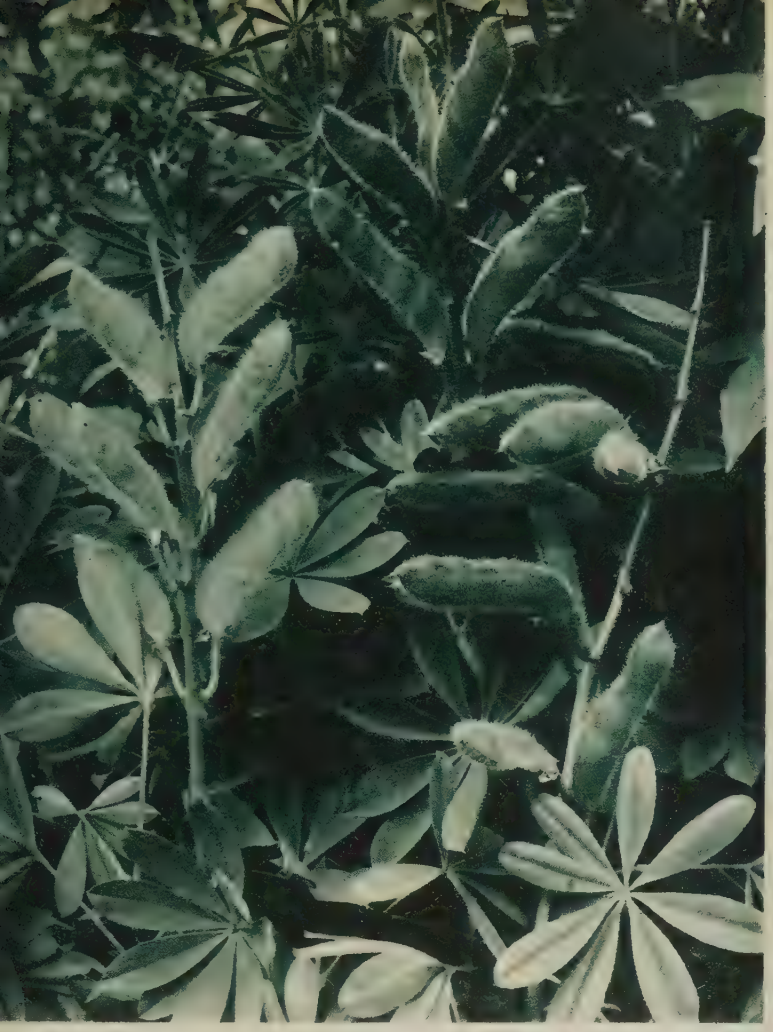
The fruit of the false Solomon's seal, *Vagnera racemosa,* is a red, aromatic berry speckled with purple. Its many flowers are white, forming a terminal panicle one to four inches long.

The white ash fruit, pictured at the right, is a one-seeded nut, provided with an elongated wing, Nature's way of providing for the transportation of the seed. The tree may attain a height of 120 feet and is native from Nova Scotia to Minnesota and south to Florida and Texas. Having pleasing, symmetrical lines, it makes excellent material for transplanting in parks or yards.

The North American lotus, *Nelumbo lutea,* grows in local colonies in rivers and lakes from Ontario to Florida and Cuba, and west to Louisiana, Nebraska and Minnesota. Its fragrant flowers are pale yellow and four to ten inches broad. The seeds, borne in a truncated receptacle, are about half an inch in diameter. There is a large colony that flowers in August at Sodus Bay, New York. The broad leaf, growing on the summit of the stem, has the property of holding globules of water on its dry surface.

A slender, herbaceous annual is the dodder, *Cuscuta gronovii,* parasitic on various shrubs and herbs in meadows and swamps from Nova Scotia to Manitoba, and south to the Gulf. The seeds from the cream-colored flowers send up long threadlike stems that seek and coil about some plant, and develop knobby roots that imbed themselves in the body of their host. Then the earth roots and the lower stem of the robber plant dies, and the dodder lives entirely on the sap of its host-plant.

The fruit of the false lily of the valley, *Unifolium canadense,* is a cluster of pale red, speckled berries. The plant grows in moist woods from Newfoundland to central Canada and south to North Carolina, Tennessee, and Iowa.



The common lupine or sun-dial, *Lupinus perennis,* grows in dry sandy soil throughout eastern United States. Its beautiful blue flowers are followed, in late summer, by the linear-oblong, hairy, narrow pods about two inches long, each bearing from three to six seeds. The leaflets fold at night and move to some extent by day, whence the name sun-dial. The plant sends its roots deep into the soil. On rare occasions the flowers are white or pink.

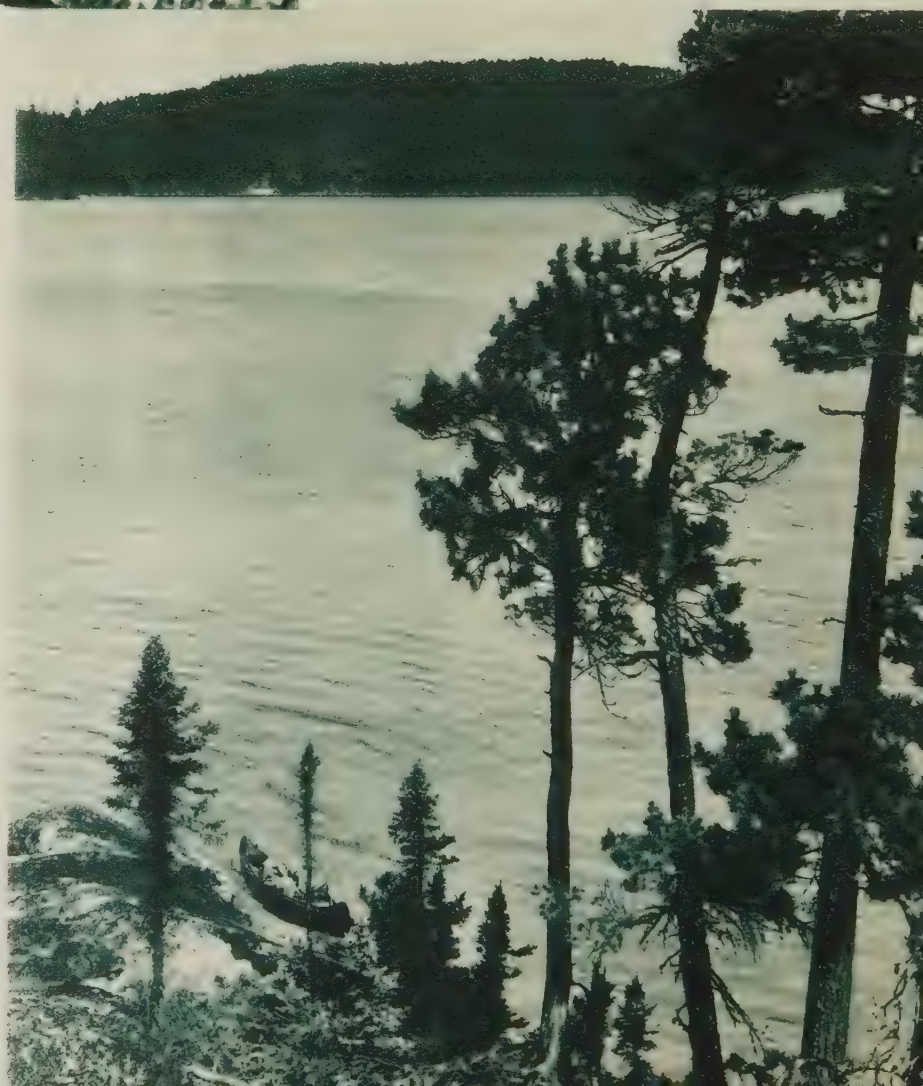
In the pine-barren country of the Carolinas may be found the blunt-leaved milkweed, *Asclepias amplexicaulis,* bearing its umbels of greenish-purple blossoms. Later are developed the curious, pointed, tan-colored fruiting follicles, four to six inches long, that hold, close folded, the myriad silky seed tufts.

The fruit of the three-leaved false Solomon's seal, *Vagnera trifolia,* is a dark red berry about one-quarter inch in diameter. It is a northern plant, growing in wet woods from Newfoundland to British Columbia south to Pennsylvania and Michigan, and also in northern Asia. The flowers grow in a small raceme.

The Nature Picture of the Month for August, which was called "Peace" by its author, was taken in Quetico Park, western Ontario, in what we hope will become an International Park. Here are two more pictures, also taken by Dr. A. R. Cahn, that illustrate two of the thousands of beauty spots that fill that lovely wilderness.

First we see a part of McAree Lake on the international boundary east of Lake St. Croix. The pine is the red or "Norway" pine, *Pinus resinosa,* near the northwestern limit of its range, which crosses our border states and southern Canada from Nova Scotia westward. The lichen-covered rock at the right indicates climatic conditions that bespeak a wonderful variety of plant life.

Here is another beauty spot on Lake McAree. In many such places the signs of old campsites show that many generations of the Chippewa Indians used them for homes, and, for all we know, may have had an appreciation of wild loveliness equal to our own.



Sunset On The Film

BY F. SEYMOUR HERSEY

No aspect of Nature is more beautiful than the western sky at evening. Every Nature lover, particularly if a camera owner, at some time has wished that he might record photographically the charm of the sunset sky. To do this is not too difficult, nor does it require costly equipment. Any camera with the lens mounted with a flange over which a filter can be placed, and with a shutter that allows of several different exposure speeds, will answer the purpose nicely. A filter, which is not an expensive accessory, will be required; the one known as K 2 is quite satisfactory. Panchromatic film should be used.

The camera should be placed on a tripod, or other firm support, facing the western sky. The landscape setting is not very important, as the sky should fill most of the picture area. Make sure there are no undesirable features, such as telephone poles or wires, silhouetted against the sky.

The focusing scale should be set at the 100-foot mark, the lens stopped down to F. 22, and the filter put in place. If the sun is thirty degrees, or more, above the horizon an exposure of $1/25$ of a second should give good results with a K 2 filter. Thirty degrees is the angle made by the hands of a watch at one o'clock. When the sun is lower than this the photographic quality of the light decreases faster than is apparent and a longer exposure will be required, perhaps $1/5$ or even $1/2$ second. The exposure should be made when the sun is behind a cloud, otherwise the light shining into the lens will fog the film.

Try a few sunset pictures. I know you will be pleased with the results.

The late purple aster, *Aster patens,* with its twenty to thirty purplish-blue or violet yellow-centered blossoms on a single stem, can be found in bloom in dry, open thickets and fields from Maine to Minnesota and south to Florida and Texas, from August to October. The stiff stems attain a height of from one to three feet, with long slender leaves clasping the stem by a deeply heart-shaped base. With this species come many other asters, always white or of some shade of blue, but with so great a variety in both the ray flowers and the yellow disc flowers that numberless differentiations result. When the asters and their relatives the goldenrods first appear, we know that autumn is near. Photographed by B. L. Brown.

The common fireweed, *Chamaeperion angustifolium,* also known as willow-herb and by several other names, is a perennial common throughout the northern United States and Canada; it occurs also in Asia. In many places it persists almost unnoticed until a clearing is made, when it increases immoderately. This is particularly true where fire has raged, hence its commonest name. The beautiful purplish or pink flowers grow in a spike, maturing quickly, so that the silk-fluffed seeds below may be flying before the flowers at the top are open. Photograph by E. V. Crandall.

These three pictures well illustrate the variety in form of our lizards. Above, the desert iguana, one of the swiftest of our United Statesspecies.Photographed by Cyrus S. Perkins.

Next the collared lizard of the West, the male beautifully colored during the breeding season, when it is green, dotted with yellow shading to orange at the throat. Photograph courtesy of the New York Zoological Society.

The so-called "glass snake" is without limbs, and thus differs so radically from most lizards that few suspect its real affinities. Photographed by R. W. Shufeldt.

Birds, Far and Near

Gentle, soft-voiced nomad, the cedar waxwing is one of our most attractive associates, usually flying in flocks, delaying their nesting until late summer, never in a hurry, seeming the embodiment of beauty, leisure and well-fed indifference, yet always paying in insect destruction for the fruit they may pilfer. Photograph by James A. Galbraith of Minneapolis.

Flightless but great travelers, with an air of silent gravity that is irresistible, best known as birds of the Antarctic, but ranging north to the Equator, penguins are always appealing. This Humboldt penguin, *Spheniscus humboldti,* was photographed on the coast of Peru by Cyrus S. Perkins of San Diego.

Owls are attractive, and small owls are especially so. Therefore we present this pigmy owl, a bird of the night from the west coast, on a limb with its lunch, to complete our trio. Photographed by Storrs H. Lyman of Dayton, Washington.

★ Conservation ★

A section of Nature Magazine devoted each month to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

ARTHUR NEWTON PACK, *Editor*

APPEALS FOR ★ WATERFOWL

As this issue of Nature Magazine goes to press there appears to be a definite upsurge in the demand for a closed season in behalf of our ducks and geese. Appeals have been coming from many conservation groups, including the National Association of Audubon Societies, the Permanent Wild Life Protection Fund, the American Humane Association and some sportsmen's groups. On July 15 the American Nature Association sent a telegram to President Roosevelt and Secretary Wallace saying:

"Recurrence of severe drought conditions in important breeding areas this year further imperils American migratory waterfowl. Strictly enforced closed season for 1936 is a responsibility to posterity that those in authority should not evade. Our few remaining resources of waterfowl merit emergency consideration comparable to that extended farmers and domestic animals in drought areas."

Disastrous results must inevitably follow the intensive drought. It is a calamity considered by some to be worse than the record-breaking dry season of 1934. It is the sincere conviction of many prominent people that this action will win more votes from humanitarians, both within and without the ranks of the sportsmen, than would accrue from that selfish minority who are interested mainly in their own immediate sport.

We hope that when this editorial appears in Nature Magazine Mr. Roosevelt will have had the vision and the interest in wildlife to proclaim a closed season on migratory waterfowl.

•

4-H CLUBS AND CONSERVATION

There is a great potential force for true conservation in the ranks of young people who are today members of 4-H Clubs, Boy Scouts, Girl Scouts and other similar organizations. By the same token, this same potential force may be blunted and debauched at the hands of those who, for selfish reasons, seek to educate the citizens of tomorrow away from true conservation.

Living particularly close to the outdoor world and, in large measure, destined to continue to do so for the rest of their lives, the 4-H Club members in particular should be given the right information if they are to assume the responsibilities of tomorrow. From information at hand we fear that they are not always being led aright. Whether this mis-direction comes from an ignorant or a malicious source we are not certain. A case in point will serve to explain.

The members of the St. Louis County, Minnesota, 4-H Club have been presented with a "Conservation Project". The project comprises twenty-six different activities under six different groupings. Members are invited to select five activities. Some of these are excellent; others poorly thought out and impracticable; four are pernicious. The four bad activities come under the head of "Predator Control". The members are invited to "set three traps and catch at least one weasel, porcupine; destroy all crows, harmful hawks and owls; destroy at least six gophers; set one turtle trap and destroy at least six turtles". These instructions are much too vague to be useful.

The title "conservation" is being mis-applied everywhere to various manifestations of "predator control". Sportsmen's groups, having nothing else to shoot at, have piously gone forth to exterminate all sorts of so-called vermin and, in the process, have done more harm than good. There are cases where some predator control is necessary, due to the degree that man has upset the balance of Nature. In these cases it should be practised by scientifically trained individuals and not by boys and hunters with itching trigger fingers. Furthermore, if we are going to educate another generation to a philosophy of extermination, many species of American wildlife will soon become museum pieces.

In another state prizes were made available for 4-H Club work by an ammunition company. The club leader in the state wisely specified that the way this money was to be used should rest with the Clubs. This was approved,

but in two counties the 4-H Club leader announced prizes for the members who would kill the most hawks and crows during the year. Fortunately this young man was shown the value of most hawks and the questionable wisdom of eliminating all crows. His campaign rose entirely from ignorance of the facts, and he is now doing all that he can to repair the damage. This indicates, however, the possibility of great damage by an organization of such far-flung character.

Our wildlife must have protection. We are leaving a pitiful remnant for the rising generation. We must make full confession to that generation of what we have done and hand on to it the best knowledge we have of how we can bring back some semblance of our wildlife resources. Protection of many species is the fundamental means. This cannot be accomplished by any program of conservation masquerading under the guise of predator control.

•

WHAT GOOD ARE THEY?

It is surprising in what intellectual circles the remark can be heard as to our waterfowl and other game birds, "If we are not allowed to shoot them, what good are they?" Game birds are few in proportion to the whole avian world, yet many non-game species are protected at all times without being challenged as to what good they may be. What good is a petrel, a hummingbird, a nuthatch, or an evening grosbeak? They do not cater to any of the appetites of mankind nor are they conspicuously useful in any way, yet they are protected.

Nearly all of the shore-birds that once were game are now protected because of the realization that any other course would soon result in their extinction. What of the buffalo and the grizzly bear, now safeguarded on national reservations; what good are they? They are precious remnants of our native fauna, the desirability of preserving which has become a matter of public consciousness.

Why should we not protect other forms of wildlife before they reach such a deplorably low ebb in numbers? In the case of the waterfowl, if we continue shooting as long as any of the fifty or more species are common, we shall certainly exterminate some of the less numerous kinds. Are not these species just as deserving of preservation as the buffalo, the grizzly bear, or the shorebirds?

There can be only an affirmative answer to that question, but if we are to make good on it, we must protect. We cannot dilly-dally along, year after year, tinkering gently with the length of the open season, or fiddling about with details of how the gunner may be allowed to decoy or shoot the birds. Protection means stopping the killing, and if we do not do it we shall soon lose all of the less common and hard-pressed species.

It is no time to ask, "What good are they?" As well ask what good are the redwood and the sequoia that we, as a nation, are preserving for strictly esthetic reasons. These trees are good as a beautiful sunrise or a lovely sunset is good; they uplift the soul of man; they feed a hunger for beauty that is a part of every wholesome human. So also do the waterfowl and every wondrous living creature. To persecute any of them into extinction is something genuine civilization cannot tolerate nor decent citizens abet. The time to act is when danger signals are flying in every quarter as they are today. If we do not act, if we do not ignore the "What good are they?" chorus, the wail of paltry, selfish spirits, we shall have deliberately chosen a course that inevitably will lead to the extinction of precious wildlife that neither man nor nature can replace.

•

We are pleased to note that the Federal Cartridge Corporation of Minneapolis is devoting its advertising to championing the protection of hawks and owls. One legend in the advertising reads: "The Hawks and Owls are the Farmers' and Sportsmens' best Friends—Three Hawks and Two Owls are said to be destroyers of wild life—Fact is they actually balance the surplus—and are beneficial." Two cartoons show a farmer remonstrating with a hunter who is out "vermin killing", and the captions read: "When you go vermin hunting leave the hawks alone. Where you find hawks you do not find an abundance of rats, mice and gophers. Few shooters know a good or bad hawk and shoot everything that flies, killing the marsh hawk, the sportsmen's most dependable friend. Do you realize owls are the Farmers' cheapest vermin destroyers; they work for nothing. The barn owl and screech owl work when you and I sleep destroying vermin and pests. The two bad owls are good owls. They destroy the weaklings in wild life and leave the strong to reproduce."

We wonder how this sentiment appeals to the hunting magazines who carry the advertising and in their editorial pages glorify the campaigns against hawks and owls?

———

At their annual convention in Madison, Wisconsin, the Association of Midwest Fish and Game Commissioners voted against any liberalization of the duck hunting regulations in 1936. On the issue of a closed season for 1936 Minnesota, North Dakota, South Dakota and Wisconsin voted for a closed season; Illinois, Iowa, Nebraska and Missouri against it.

———

The July issue of *Outdoor Indiana* proudly reports that feet from 146,000 crows have been turned in by competing "conservation" clubs in three campaigns against the birds in the Hoosier State. Bird lovers, game bird shooters and farmers are reported to be deeply appreciative of the reduced crow population. So are the grasshoppers that have been eating up the farm crops.

BIRDS FROM A COLONY OF CALIFORNIA GULLS AND OTHER WATER BIRDS AT MALHEUR LAKE IN 1908 WHEN THIS NATURAL BIRD HOME WAS STILL WELL-STOCKED

All this completely dried up, the rights to the lake became a subject of legal battle, nesting grounds became hard-baked soil and one of the most important areas for the natural breeding of water birds was utterly destroyed. Photographs by William L. Finley and H. T. Bohlman

Malheur, the Unfortunate

By WILLIAM L. and IRENE FINLEY

IF ONE were influenced by the common superstitions of bad luck on Friday, the 13th, the inimical black cat across one's path, or seeing the slim rim of the new moon over the wrong shoulder, he would be duly impressed by the long line of misadventures that may ensue through the bestowing of a mere name by a morose godmother. Malheur Lake in southeastern Oregon, which acquired its name from a now insignificant river, has been harassed by an evil nemesis all down its long historical trail.

The spell was laid through a chance happening. In 1825-26, Peter Skene Ogden, a Hudson's Bay Company trader, made an expedition into the Snake River country. In his Journal we find: "Tuesday; February 14, 1826, —We encamped on River au Malheur (the unfortunate river), so called on account of goods and furs, hid there, discovered and stolen by the natives."

Leaving the little river and crossing through the gap of the Blue Mountains, Ogden saw a sight that astonished him, a great body of water heavily bordered with brown tules or club rushes stretching beyond the limit of vision. From a distance, the marsh was a level sea completely deceptive of its real character. The ocean surface tells nothing of its hidden wonders; so, also, the marsh. A closer approach and the wind wafted to the travelers a mysterious murmur, which developed into a babel of voices. It was the great bird city of the West.

February was the quiet season of the year for this huge natural bird sanctuary. No one a hundred years ago had even thought of bird sanctuaries as we are compelled to do now. Spaces were wide; there was room for men and birds, too. There were millions of acres of prairie land and marshes and ponds, just as they were at the beginning of history.

But at that, there was activity in this newly-found bird world, for some of the feathered residents were permanent in this high plateau region of dry cold days and nights. In spring, it would be a different story. The world would be awake, the tule islands and borders alive and teeming with birds, mating, calling, trumpeting—an exuberant chorus of spring songs. This was the great half-way house for feathered migrants along the Pacific fly-ways. And it was the home of fur-bearing animals, the otter, beaver and muskrat. A muskrat mound has furnished a night's lodging for many a trapper lost in the mazes of the Malheur.

Listen to the babel. With plenty of rich bunch grass, hobble your horse and settle yourself into your blankets.

HALF-STARVED CATTLE TRYING TO GET FOOD FROM THE BARREN WASTE THAT ONCE WAS THE BED OF MALHEUR LAKE

This picture, taken in 1924, represents the exact place where glossy ibises were nesting in 1908, the year that Theodore Roosevelt proclaimed the lake a bird refuge

The sky is so steely clear that it seems you could pick the stars above your head. Out in the lake the bird city is in full swing. It never seems to go to sleep. Just below your bed is the Spring Branch that helps feed the lake. Thence come the soft conversational quackings of the ducks idling in the dusk of the tules. A little farther away, the reticent Canada geese are expressing in musical tones their satisfaction of the night and the place. Beyond, from the highways and byways between the tule islands, you distinguish the strident quawks of the night herons and the great blue herons intermingled with the underhum of many small waders, and, far away and eerie, the clarion call of the sandhill cranes, those tall, elusive dwellers of the deeper marsh. Unplaceable is the ventriloquial liquid pumping of the bittern.

WESTERN GREBE, MALHEUR LAKE, 1908
These birds were the victims of the plume hunters before the reservation was established

The bird species known to inhabit this wild paradise are the mallard, pintail, gadwall, redhead, ruddy duck, cinnamon teal, Canada goose, white pelican, California and ring-billed gulls, black, Forster and Caspian terns, eared and western or swan grebes, American egret, black-crowned night heron, American bittern, coot, sandhill crane, black-necked stilt, avocet, Wilson or jack-snipe, Wilson phalarope, killdeer, long-billed curlew, willet and many others. They possessed these inalienable resting and feeding grounds with the faith that they would defy civilization to the end.

Perhaps, but not without many ups and downs. These credulous birds could not know that other wild folk had lived here before the white man ever saw it. The buffalo had long ago roamed Malheur and Harney Valleys and had fallen before wanton hunters. Today their bleached skulls are unearthed by the plows of farmers. The herds of antelope that had fed lazily on the grassy prairies are reduced to anxious remnants. The coming lean days of too many sheep and cattle, and erosion of their feeding grounds were unknown to the bird multitudes. The near-isolation of their great lake by drought and dry seasons had not touched them, but soon would.

Drop down the time-trail fifty or sixty years from the fur trader's visit. Civilization, so-called, was upon the birds. The big body of water was shallow, alkaline, brackish. And the very effulgence of life and numbers and security led to persecution. The coming of the plume hunter and the market shooter was surely the evil hour, Malheur.

The Special Executive Order of President Theodore Roosevelt on August 18, 1908, establishing the Lake Malheur Reservation, put an end to the devastation of these hunters. The whole area was "set aside for the use of the Department of Agriculture as a preserve and breeding ground for native birds." The dark clouds would be lifted forever, and Malheur Lake would supply waterfowl enough to stock the whole Pacific Coast.

Yes, for a short time. But for years another storm cloud had been brewing over the birds. Who owned this lake of theirs, the State of Oregon or the United States? One quibble in the argument hung on how deep the water was and whether this was a navigable body. The birds couldn't tell. A bill was initiated for popular vote. For the most part, the voters of the state would have signed the birds over to the government because of its existing machinery for patrol and protection. But a bunch of settlers and promoters from the lake region raised a wailing battle-cry of "Birds or Babies, Which?" The babies won. Or did they? Some of the squatters' youngsters out there looked as if they lived on jack-rabbits, and since then the President has been trying to find better homes for them.

Before anything was settled, the birds were haled into court for defective title to the ground under their feet. The water had been dwindling so fast and was so shallow that it was not worth mentioning. There followed a tangled turmoil of jealousies and legal *and/or's,* which was settled only recently in favor of the government. It had cost the people a goodly sum of money, this dawdling in the courts.

This "birds or babies" display of emotion for the home land was really the herald of trouble in a new direction. The early story of wildlife is one that follows the movement of men across the country, even into waste places. Years ago it was the plume and market hunters that we thought meant the end of the birds. This was like a mere visitation of the measles, soon cured. With the coming of the land promoter, a more insidious disease fell upon the feathered residents of the lake. It was a canker in Nature's balanced system, a schemer who persuaded state and county governments that vacant desert lands could be turned into prosperous farms, that ponds and marshes could be drained and would add agricultural wealth to the communities.

In this period, civic organizations, chambers of commerce and even the railroads fell in with the idea of inducing settlers from the Middle West and the East to come out and locate on remaining public lands throughout the dry sagebrush country and especially in the submarginal areas. Common sense would have told even a casual observer that these were not fit to support families.

So this promotion fever swept through the western country, eating away the feeding and nesting places of the migratory flocks. Water birds could not live without homes. This false land promotion was an epidemic that would not merely kill birds for their plumes but would take everything. And woe unto the next generation.

The picture that followed this land promotion flurry was one of desolation; deserted shacks with a few starving cattle standing expectantly at the back door; deserted schoolhouses with owls roosting in the belfries; wind-blown sand sweeping across the bleak spaces—lonely, lonely. It was a pathetic ending of the efforts of misguided men to make homes.

It never rains but it pours. The birds of Malheur Lake know all too well that it pours calamity instead of rain. For the rain began to fail them, and their big lake now began to recede rapidly and to evaporate in the summer sun. This was the end. A few might survive the plume hunters, promoters and politicians, but to waterfowl what's a lake without water?

The water from the north and south that had from time immemorial flowed into the big basin was gradually being diverted and spread out over the sagebrush regions for pasture for stock. This might sound legitimate to anybody but a bird. But it came to pass that the cattle owner, as well as the birds, was going dry. Two watersheds feed the Harney Valley in which Malheur Lake lies. These are the Blue Mountains on the north and the Steens Mountains on the south. The Silvies River flows from the former, and the Blitzen (originally Donner and Blitzen) from the latter. In a series of years of lessening rainfall from these mountains, the streams have dwindled as a natural result. In very recent years, the Silvies has stopped at the edge of the town of Burns, leaving, farther down, bone-dry fields and no pasture for stock. The Blitzen, from the Steens, has held up a fair supply of water and flows down through the P Ranch Valley, a big cattle and hay ranch running for some thirty miles. Thence the river spreads out directly into the lake.

The P Ranch has always been a fine wild game region. Acres of ducks and geese and many kinds of other birds go ducking and bobbing through the water, or sheer away as you ride along the roads on top of the dykes. It is a luscious sight to a bird lover. And not only waterfowl live here contented and well fed, but antelope, deer and sage grouse are tenants on different parts of the property.

As Malheur Lake began to dry up, many of the birds left and made permanent homes up the Blitzen Valley. Those that were stand-patters and couldn't leave the spots they had known for years brought misery on themselves by sticking it out. A well-known colony of American egrets, once diminished by plumers almost to the last bird, built their platform nests in the willows at the edge of the lake. A visit to the colony last season would bring tears even to a politician's eyes. High and dry in wide, bare fields the spindly willows stood, where originally their feet had been wet by the waters of the lake. In their thin tops were a few dozen big stick nests. As they were disturbed, the egrets flapped white wings into the air.

The ranchers who owned these areas had pulled up stakes and moved down with the receding shoreline of the lake. And when the great lake gave its last gasp and lay dry and powdery from one shore to the other, the squatters moved in and took possession. It looked as if they had been watching for the event, for they hustled to get ahead of one another for favored spots, each section marked by a hasty plow furrow. Then tents began to stick up over the lake bed, and soon big tractors were plowing and harrowing the alkali ash, getting ready for crop planting. They took a long chance, for heavy wind storms every year in these wide open spaces blew the soil and seed away. Twenty miles from the top of the long butte, one stood and watched the dust storms that literally filled the big valley, and long funnels where draughts pulled them into the sky. On a windy day residents in the town of Burns expected to be enveloped by a thick dust that resembled evening light.

In the meantime, there was a small peep of remembrance from the Biological Survey away off in Washington, important seat of administration and bird protection. For many years, they had been too busy to find out much about what was going on at Malheur, or to protect the water rights that legally belonged to them, or to see the squatters' fences that soon took the place of plow furrows as boundary lines on the lake bed, or the thousands of cattle grazing in spots where grass grew, the rightful feed for ducks and geese. Of course, they didn't want to crack down on trespassers until the ownership of the lake bed was established, or have any fuss with the settlers. This spineless policy in the face of the fact that Malheur Lake Reservation had been established by the Executive Order of a President, and that it was recognized as government property until it was proved otherwise, and that they were in possession. And, moreover, they were running a large administrative establishment back there with many men in the field, and had accepted the trust upon official authority to guard and protect the interests and lives of native birds here. (Why shouldn't the birds put on a hunger strike and leave—or die?)

All at once "Ding" Darling came to the front, if Washington can be called the front. Although it was a bitter struggle, some funds were squeezed out of the big bag to save the birds at Malheur and other hard-pressed sanctuaries. The P Ranch, permanent source of water supply, was bought outright, making sure that Malheur Lake would be flooded and again ring with a bird chorus.

Now things are fairly jumping around the lake. Stanley G. Jewett, who is steeped in the bird tragedies of Malheur, has just become its superintendent. It's a new era with CCC boys working on headquarters buildings, roads, dykes, and stretching a fence around the whole border for a sanctuary instead of a stockyard. These young fellows are getting a different slant on the world and a kick out of this kind of wildlife. The most fun of all is banding ducks out in the middle of the marsh and learning about all kinds of other birds. These boys may never want to go back to Chicago. Malheur, the unfortunate, is at last returning to her own.

BOYS AND CONSERVATION

Article in February issue brings interesting response

THERE has been an interesting response to the article "Boys Are Killing Our Birds" by Edgar Kincaid, Jr., in our February issue. This has come both from adults and from the rising generation of conservationists. The former have, in several instances, requested permission to republish the article. This has, of course, been granted. The younger people have added fuel to the fire started by young Edgar. Space does not permit quoting all that has been written to us, but we should give some idea of the response.

Among those who have written is Arthur R. Moffatt of Syosett, Long Island. He says that being a boy himself "I have had plenty of opportunity to observe some of the crimes upon Nature which boys are committing every day. . . . Some boys have absolutely no idea of conservation." Arthur says that although he likes to fish he returns all the fish he catches to the water unless they are badly wounded. Doing this, he says, he is branded "as either soft in the head or chicken hearted. Yet sometimes I have been with boys who would take thirty or forty yellow perch out of a small lake, carry them home and throw them in the ash barrel. . . . When boys are asked why they want to kill all the squirrels or porcupines in the neighborhood the usual reply is: 'What good are they?'

"Certainly this deplorable situation must and can be remedied. Education and education alone can bring about a change in the attitude of boys toward Nature."

Thomas Knowles of Monrovia, California, describes himself as a "reformed bird killer." Fortunately his reformation came early because in his letter he describes a rather active early career of destruction. And young Mr. Kincaid may have the satisfaction of one convert because Thomas writes:

"I have always considered myself as being a tuffy in some lines, and thinking myself pretty good when I hit a bird at some distance with my air gun, but as I read through that article I realized what a big mistake I had made and felt deeply ashamed. . . . I would like to thank Nature Magazine for printing that article that broke me of the habit of killing birds. And you may be sure that there are going to be more boys in Monrovia who will quit killing birds as I have quite a bit of power here."

Other boys have commented along similar lines and are heart and soul with Edgar Kincaid. One of these is Kenneth Stubsten, a Boy Scout of Miller, South Dakota, who sends us a brief but competent analysis of the migratory bird situation. Such letters as these give us hope for the future and make us realize the importance of such groups as the Boy Scouts.

However, fifteen-year-old Wahnita Lucus of Muscatine, Iowa, came forward with a penetrating little article that she entitles: "Why Boys Kill and Destroy." We publish this just as she sends it to us because we think it is worth reading and thinking about. Here is the way Wahnita puts the situation:

Jimmy's mother was nearly in tears. She had tried so hard and yet Jimmy would hurt and destroy. This time it was a beautiful cardinal. He had stunned it with the much forbidden sling-shot and now was torturing it.

"Oh, Jimmy, I've told you so many times how wrong it is. Why, why must you do it?"

The answer is simple. All you have to do is to visit Jimmy's home some morning in the fall. The scene would probably be something like this.

"Hey, dad, how many ducks did you bring home?" asks Jimmy.

"Three!" came the curt answer from the tired, worn-out parent.

"Gee, you aren't a very good shot. I bet I could'da got more than that with my sling-shot," answered Jimmy.

"Oh, I got more than that," replied the parent, "but they were just wounded and got away."

"But what'll happen to 'em?" asked Jimmy, just a bit wistfully. "They can't fly, can they? I don't see how they'd get their eats."

"I guess they'll die; I don't know and care less. Now run along and let me alone. I'm dead tired," replied the father, who was too tired to teach his son the difference between a sensible hunting trip and the one he had just returned from.

There is the answer to his mother's question. Jimmy's father deliberately shot ten ducks and left seven to suffer and later die from starvation or enemies. He killed only for "sport" yet he has the nerve to say:

"I don't see why Jim's so cruel." He himself is to blame; he taught Jimmy to murder.

But if you reprimanded any parent the answer would invariably be, "Oh, that's different." Yet, I ask you, why is it any different to kill and torture with a gun than with a sling-shot? In fact it's worse, because a man with a gun has more of a chance to kill than a boy with the less accurate sling-shot.

Even in the spring, ducks are killed. Just the other day I found two dead ducks hanging on a bush. Probably the game warden got too close.

Still conservationists blame boys for a good part of the damage that is done; never thinking of why it is done. Some do, yes, I admit; but they are not acting; they are merely thinking.

I make my plea not for conservation among boys but among men. Our young people must be taught conservation, but first we must have someone capable of teaching them. One could hardly expect Jimmy to love and protect birds, living in his environment. Probably ever since he has been old enough to understand he has been fairly aching for the time when he could get up at four o'clock and go duck hunting.

It is not the cruel, cruel boys, as some people put it, but the men who need to be taught conservation. On with conservation!—but in the progress of it let's place the blame on the rightful owners—on the shoulders of men, not boys.

In this Jimmy's mother and many other mothers have their question answered.

Conviction Without Trial

Absolved of destroying food fishes, the double-crested cormorant is still persecuted

By HOWARD L. MENDALL

Photographs by the Author

A HUNGRY YOUNGSTER BEGS FOR FOOD

The author's studies of the life history of the cormorant were made possible by grants from the Coe Research Fund

In the early days of economic ornithology, certain birds that fed partially or entirely upon fish were placed on the doubtful list with respect to their utility. Some of these species came under the provisions of the migratory bird law and were assured of a certain amount of safety, but a few were given no Federal protection at all, their fate being left to the various communities, with the result that only a small number of States were interested enough in conservation to prohibit killing of them. Among the most persecuted of all fish-eating birds are the cormorants. Shy and wary, these birds have been little known, despite their large size, and it has been unfortunate that they have been forced to suffer because of man's tendency to form hasty opinions. For man has known that the cormorants live almost entirely on fish and he has seen fit to assume, without a particle of evidence, that food fish and game fish form their livelihood.

The most common representative of the family in Eastern North America is the double-crested cormorant. The marine inhabiting members nest coastwise about the Gulf of St. Lawrence, Newfoundland, Nova Scotia, New Brunswick and Maine. The fresh-water birds are found nesting in Alberta, Manitoba, Saskatchewan, Ontario, Wisconsin, Minnesota, the Dakotas, Arkansas, Wyoming, Montana, Indiana and Tennessee. These birds spend the winter in the waters of the lower Mississippi, the Gulf states, and along the Atlantic seaboard from New York to Florida.

The whole history of the double-crested cormorant has been one of persecution. The early settlers of New England found the Indians killing vast numbers for food, and some of the Labrador fishermen, Indians and Eskimo still eat the birds. White man, however, has been the chief offender, for he has killed them simply for "sport," or because they consume fish. It has not mattered that he did not know what kind of food the birds ate, the all-important fact was that fish of some kind were taken. The coastal residents have been severe in their treatment of the cormorant, but their wrath has been mild compared to that of the fishermen who are interested merely in sport. For many years, salmon and trout have been slowly disappearing before the hordes of sportsmen who have sought out every known stream and lake, and since cormorants were present at some of these lakes, a plausible excuse was presented to account for the diminishing game-fish.

ADULT BIRDS GUARDING THE YOUNG

The double-crested cormorant will defend its own nest but will not band with other birds defensively

A bit of intelligent reasoning should have served to clear the double-crested cormorant of suspicion. Obviously, any bird will be likely to obtain that food which is most easily captured. Trout and salmon are speedy, powerful and active—if they were not, they would hardly be the favorites of the sportsmen. Why should a cormorant, or any other bird, attempt to catch such fish when slower moving forms are always available? The cormorant is largely a bottom-feeding bird and finds, in such places, an abundance of eels, catfish, suckers and the like—species having no great economic importance and sometimes actually preying upon young trout and salmon. There is no question but what food fish are occasionally taken, and records from the Mississippi

Valley region show bass, pickerel, shiners and pike to have been found in the stomachs of cormorants. It is a noteworthy fact, however, that trout and salmon have almost never been found. Indeed the cases where food fish were eaten have been extremely few and certainly cannot justify the treatment that the birds have received.

Perhaps it is only natural to expect that fishermen in the early part of the twentieth century should look upon the double-crested cormorant as an enemy. Comprehensive study of its food habits had never been made, and any bird that lived solely upon fish could hardly hope to enjoy a good reputation among the thousands of coast-dwellers who depended upon the sea for a living. Today, however, we do not have to wonder what kind of food the double-crested cormorant eats. It has been more than twenty years since the first real study of the economic status of this species was made. This survey, undertaken in response to complaints of the salmon fishermen, was overwhelmingly in favor of the birds, and not a trace of damage to the salmon fisheries was found. Since that time, our knowledge with respect to the feeding habits of this bird has steadily increased through Government agencies and through private investigators. All of these researches have brought to light more and more evidence in defense of the cormorants. It has been found that they feed abundantly upon sculpins, cunners and gunnels, fish having no economic importance. In fact, sculpins and cunners are highly predatory upon the young of food fish, and the cormorants are actually rendering a service to the fisheries by keeping these worthless forms in check. About the only possible damage of which the marine cormorants are guilty occurs when they enter weirs and nets in search of herring at times when other fish are scarce. It has already been pointed out that the inland birds take bass, pickerel or pike only occasionally—certainly not the trout and salmon which their critics have believed were eaten.

AN ADULT CORMORANT BROODING YOUNG

The parent birds share the responsibility of the rising generation and family solidarity is pronounced

Apparently these detailed investigations, clearly showing the lack of detrimental qualities, have been largely in vain. Apparently man still prefers to condemn this bird simply because it does not live on weed seeds or insects, for the research of the past twenty years has resulted in little benefit to the cormorant. The various workers who have studied the food habits have all pleaded for more protection, and who should know conditions better than those who are familiar with both sides of the question? The Canadian Government, it is true, has established certain breeding islands as sanctuaries, but this is of little help when the birds are shot in the United States during the migrations and during the winter. The National Association of Audubon Societies has guarded nesting colonies in the few states that afford protection to the bird, but here again these efforts have not been enough to offset the slaughter that has taken place in Minnesota, South Dakota, North Dakota and many of the southern states where the double-crested cormorant ranges in winter. It is high time that we recognized this bird at his real value and gave him a little support in his efforts to maintain a place among feathered animals.

Aside from an economic neutrality, the double-crested cormorant has a definite worth from æsthetic and scientific points of view. Originating from primitive stock, this species has retained some of the characteristics of the lower birds and at the same time has shown many of the advancements of the highly specialized forms. Gregarious by nature, the cormorants nest with hundreds of their kind, usually on remote islands. One of the largest colonies in Maine is located on Marblehead Island in Penobscot Bay. Here, on a rocky, wind-swept ledge, barren of all vegetation save a few weeds, more than six hundred of the birds build their bulky nests, placing them so close together that occasionally two or more nests may be touching.

To the ornithologist, there is always something to learn from these interesting creatures whose habits are partially colonial, partially individual. They differ from most sea birds in the development of the protective instinct. Gulls and terns will band together to repulse an enemy, but the cormorants have no interest outside their own nests, and will not pursue an intruder beyond the confines of their respective territories.

The home is the center of attention, and the birds conscientiously fulfill every parental duty, from the time the eggs are laid until the young are able to take care of themselves. The young are protected for at least nine weeks, and it is a common sight to see an adult feeding a young bird which is as well able to fly and to swim as its parent. While such acts have been observed among other birds, these full-grown cormorant offspring are fed by the same method that was used when they were nestlings—by regurgitation.

The nest-building instinct lingers throughout the entire breeding season. Whenever one adult relieves its mate on the nest, a fresh piece of sea weed is usually

brought in and placed on the ever-changing home. Frequently the female alone enjoys the privilege of actually arranging the material, and the ceremony is accompanied by a great deal of petting and caressing by the two adults. Affection for their mates is one of the outstanding characteristics of this species, and the courtship display is continued long after territory has been established and the nests completed. In one instance observed in August at Marblehead Island, a pair of double-crested cormorants continued to caress each other and to bring fresh material to the nest for several days after their young had forsaken them entirely.

Students of animal behavior can obtain a great many valuable data from the home-life of these birds, while their presence along the coast or inland bodies of water lends a distinct touch of wild color to the surroundings. Thus, if it were only from a standpoint of ornithology, it would be worth while to protect the double-crested cormorant. Fortunately, we do not have to appeal for conservation on this score alone, for we can find little to criticize in the food habits of the bird, despite the old beliefs. We have impartial facts available, and they all point toward the cormorant as a desirable citizen. Let us, then, give him his full rights of citizenship.

•

DUCK SHOOTING STORIES

Sportsmen refuse to apply Nature's laws to their own reasoning

Supreme Duck Shooting Stories, published by W. C. Hazelton, Chicago, 1934, is a collection of outstanding articles on this subject. It is proper to state that most of them have reference to the days before we came to realize that there could ever be an end to our waterfowl. Some of them are very interesting and all are part of the literature of American waterfowl. Their gathering and publication in this form is, therefore, legitimate and even desirable.

But we must object to certain passages in the introductory chapters, for they are examples of a kind of loose reasoning that is too often given expression, and which has already resulted in irretrievable harm. We quote:

> The idea that hunters of wildfowl are exterminating the breeds of ducks is an exploded theory, in spite of the increasing stringency of game laws. Conservationists have learned lately that the increase or decrease of wildfowl depends not so much on the number of birds killed by hunters in our brief season of shooting as on the conditions of the breeding grounds of the North and the food supply in winter. We know now that millions of ducks are being killed annually by the drainage of breeding grounds in Canada and the disastrous marsh fires which burn the eggs and roast alive the mothers while sitting. Then there is the destructiveness of that ebony rascal, the crow, among nesting waterfowl. The energies of governments must be turned toward the protection of our game during its nine months of reproduction rather than the gunning season. And during these three or four months when the birds have come south, the concern of government should be the development of their feed as well as the restriction of gunning.
>
> It is not true that it makes a man cruel or selfish to roam the fields with a gun or sweep the shining surface of wide reaching waters in search of wildfowl. On the other hand, its effects are just the opposite. He draws close to nature, learns her laws and feels the sweep of her elemental life. Every fiber of character is truly strengthened by the care, skill, patience, and judgment with which he follows game. Such men are strong, sane, clean and wholesome.

But if by shooting waterfowl a man "draws close to Nature, learns her laws and feels the sweep of her elemental life", he should apply the lessons of her laws in his own reasoning.

No law of Nature is more universal or more powerful than the one that decrees that all wild creatures are subject to checks. These include diseases and other unfavorable factors inherent in the creature's structure, natural enemies, and environmental factors, including failure of food and unusual weather. While the waterfowl were building up the enormous populations that modern man found here in North America, they were subject to all these checks, and probably had reached their normal limit of abundance. Then came civilized and semi-civilized man from Europe and Asia and Africa with his agriculture and modern weapons. Drainage of former breeding grounds (which altogether affected only a fraction of the total nesting grounds) is serious enough, but it is a reason for greater rather than less forbearance and unselfishness. For every marsh drained in the United States and southern Canada there are a hundred in the Great North now untenanted because of the overshooting that has been going on for two generations.

On a succeeding page we find the same author regretting a thousand times that on one occasion he was prevented from taking a shot into a raft of black ducks, closely massed among the decoys, and lost the chance to make "the one mighty pot-shot of my life and kill a hundred."

Verily, the lessons that a sportsman gleans from his associations with Nature are beyond our understanding.

SPORTSMEN AND BAITING

Waterfowl face crisis that demands restrictions

In its defense of North American migratory birds, whose fate rests in its charge, the Biological Survey is beset by many difficulties. Ever since the treaty with Canada was established and the migratory bird law was enacted, powerful groups of gunners, self-styled sportsmen, have resorted to political influence to hinder the Survey in the prosecution of its sworn duties. Merely to enumerate the methods resorted to would be tedious. As a result, the birds that furnish sport to the selfish minority among those who hunt have steadily become fewer in numbers. This condition naturally has led to necessary restrictions governing hunting, and then these restrictions have been blamed for the decline in waterfowl by the very people who have refused to obey them.

The present season presents a crisis in waterfowl protection that is as serious as any ever encountered. Our own breeding grounds, which never produced more than a fraction of North America's waterfowl, have gradually become reduced, and latterly have been well-nigh destroyed by drought. The efforts to rehabilitate them naturally have had meager results. With the reduction in total breeding stocks, the great nesting grounds in the North, in no wise impaired, are but poorly tenanted. In this dire emergency the Chief of the Biological Survey, Mr. Gabrielson, a naturalist of wide experience, has announced that the laws and regulations will be enforced to their fullest extent, for the benefit of the birds.

With the continuance of their sport depending on a supply of wild-raised birds, one might think that enforcement of needful restrictions would receive the unqualified support of all gunners. But a selfish minority is active in opposition. Conspicuous is an organization of hunters known as the Illinois Sportsmen's Association who now endeavor to defeat the regulation against attracting waterfowl to shooting grounds by baiting. This organization charges discrimination against its own membership, and ignorance on the part of the framers of the regulations. As a matter of fact, the destructiveness of baiting was amply proved by many years of careful investigation, and particularly by the opposition that beset all efforts in the long battle for its banning.

In an address delivered before the Association of Midwest Fish and Game Commissions at Madison, Wisconsin, on June 16, 1936, a spokesman of the Illinois Sportsmen's Association gave a lengthy defence of baiting. This was mimeographed and widely circulated. Its purport may be best understood by the following quotations:

> I want to ask an attitude of sympathetic understanding on the part of you gentlemen toward what has become a real problem to your fellow sportsmen in Illinois. This problem is created by what appears to be a growing resentment on the part of sportsmen in neighboring states—plus the ignorant criticism of pure sentimentalists—toward our policy of artificial feeding of migratory waterfowl, or more particularly ducks and geese. . . .
>
> I have no hesitancy in saying that such sentiment and criticism as exist against artificial feeding are based very largely on lack of knowledge of just what is done in Illinois or on pure sentimentalism based on wholly exaggerated reports of unsportsmanlike methods employed by Illinois shooters. . . .
>
> I have shot ducks in the Illinois River bottoms now for nearly thirty-nine years and the actual conditions of duck shooting today are not very different from what they were thirty-nine years ago. Nor do I find much difference in the number of ducks. You will encounter a certain number of "old timers" who say that there are not as many ducks as there used to be. You will find an equal number who say that there are more than ever. . . .
>
> As I have tried to point out to you gentlemen, the only reason we use artificial feed in Illinois is because our natural feed is gone. The sportsmen of Illinois did not undertake an expense for feeding that runs into millions of dollars just because they wanted to. They did it because they had to. . . .
>
> So why agitate to rob thousands of Illinois sportsmen of their present good sport? Isn't the future of our ducks safer in the hands of the sportsmen than any place else? As stated above, Illinois sportsmen understand this situation thoroughly and they further appreciate very definitely that duck shooting among the sportsmen of Illinois is over if artificial feeding is banned by law. They understand it so well that every legal effort will be made to prevent its being banned by law even if it comes to fighting the matter out in the Supreme Court on the basis of states rights—a course which Illinois sportsmen would regret very much having forced on them. . . .
>
> We in Illinois believe that artificial feeding of ducks everywhere is a good thing. To answer the complaints of some of our sister states, who sometimes are inclined to feel that Illinois has more than its share of ducks on account of artificial feeding, we suggest that they take up artificial feeding themselves. In fact I can think of nothing that would be better for the great body of ducks than to have competition among states to see which state could feed the ducks the most, because it is a well known fact that abundant food is a vital factor in the preservation and increase of any kind of wild life. The very fact that mallards, pintails and black ducks—which are most generally artificially fed—are the three species which have thrived the best during the past ten years, supports the above statement.

Interlarded among these paragraphs, which seem to indicate the trend of the argument, are numerous assumptions and statements that indicate an ignorance, either real or assumed, that considers nothing except a determination on the part of the organization to pursue at all hazards the intensely selfish course it has mapped out.

Mr. Gabrielson, in an address to the members of the Illinois Sportsmen's Association at Chicago, on June 29, ably defended the Survey, and appealed to all sportsmen to fulfill their own part of the obligations due the birds.

In these days no one can predict the end of any movement, but we have no hesitation in saying that the ultimate fate of our pitiful remnant of ducks and geese depends on the suppression of all such efforts to defeat protective measures. Only by a firm stand, and by ignoring all specious arguments, can the birds be saved. Pressure from politicians and from selfish minorities cannot produce waterfowl, a continental resource, but it can destroy them.

MICHIGAN WATERFOWL

Michigan Waterfowl Management, by Dr. Miles D. Pirnie was published by the Game Division, Michigan Department of Conservation, at Lansing in 1935. Dr. Pirnie has studied waterfowl in Michigan since 1928, first as ornithologist for the Department, and later while in charge of the W. K. Kellogg Bird Sanctuary for Michigan State College. He is, therefore, well equipped by interest and training to prepare such a report as is here presented.

Chapter 1, covering about fifty pages, treats briefly the various ducks, geese and swans (with a few water birds of other groups) that breed in or visit Michigan waters. In this treatment are included statements of the breeding or migratory status of the various species. There are chapters on natural enemies; diseases and parasites; waterfowl hunting; laws and regulations; refuges and sanctuaries; the duck food problem; planting programs; propagation and restocking; predator control and a management calendar. In an appendix are keys to fifty species of Michigan aquatic plants, and details of a large number of stomach examinations of twenty-one species of Michigan waterfowl. There are also a considerable bibliography and an excellent index.

The author's discussion of the various subjects indicated are in general marked by fairness and thoroughness. In the fields of laws and regulations, and waterfowl foods, he has given us the results of a long and patient study presented in a scholarly manner. The author's tolerance of pole traps, despite the evidence presented as to their destructiveness, must be attributed to his study having been presented under the auspices of a department concerned only with game and fish.

In some cases conclusions regarding subjects concerning which there can be little real uncertainty seem to be expressed in excessively guarded terms. Perhaps this is because the study concerns Michigan only. And this brings us to what we consider the only weak part of this report, the almost total lack of reference to the real source of Michigan's waterfowl. Although Michigan is more favored than many states in the matter of waterfowl breeding grounds, she is indebted to Canada and Alaska for most of her waterfowl, certainly for eighty-five percent. This being the case, Michigan, or any state similarly situated, can practice waterfowl management only by the most rigid cooperation with the Federal and Dominion governments. That the exact degree of indebtedness to the main sources of supply in the north cannot be calculated by each state seems to us immaterial. The waterfowl cannot await exact figures relative either to total supply or apportionment among the states. The main facts are well known and have been known for a long time. Although no exact figures for either waterfowl populations or kill are available for Michigan, or any other state, Pirnie's conclusions, despite their conservative tone, leave little doubt as to the desperate needs of North American waterfowl. Therefore, we commend this report as worthy of the careful consideration of any waterfowl-consuming state in the Union, and with the advice that all such states include in their management practices such methods as will take into account the sources of the supply of ducks that must pass before the muzzles of the guns in their own state, and others along the line of the particular flyway traveled. Without such consideration reports on waterfowl management in any state will be little more than guideposts along the road of swift extermination of the birds that are being managed. E. A. P.

•

LISTING GAME VIOLATORS ★

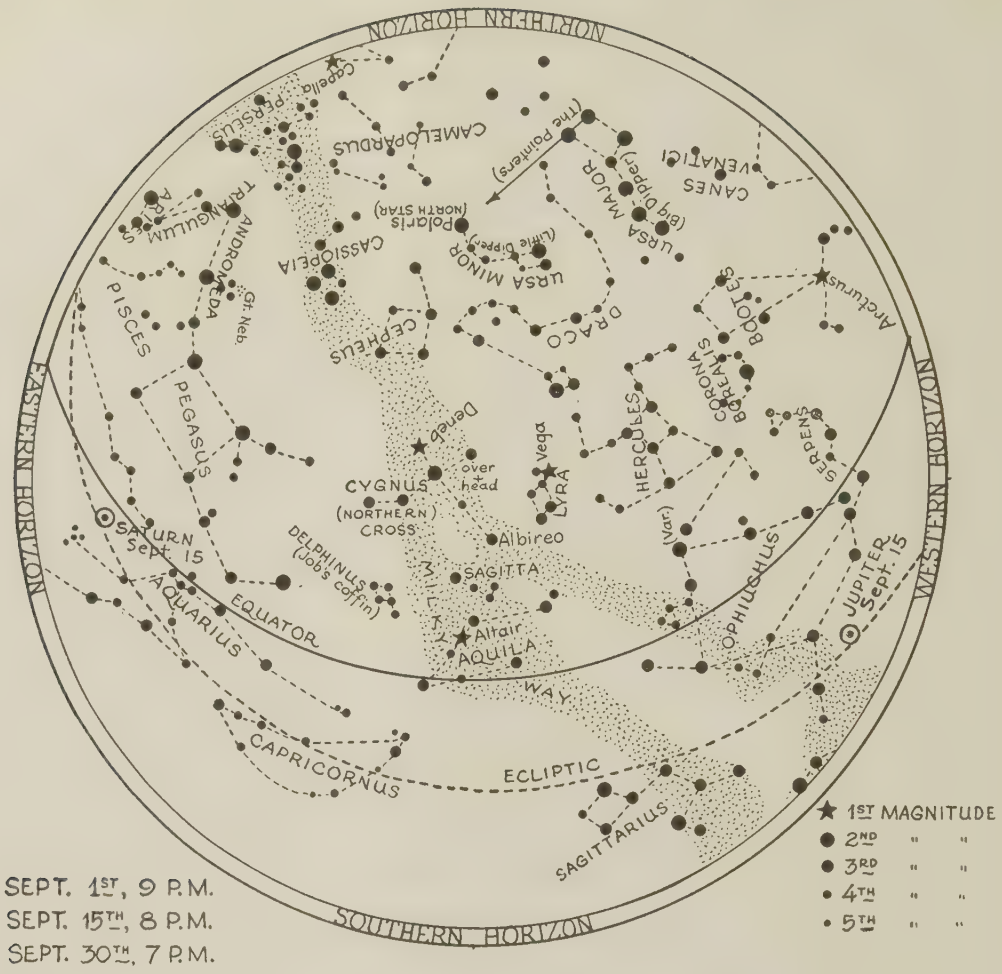
A recent issue of the Wisconsin Conservation Bulletin, published by the Conservation Department at Madison, presents a detailed list of arrests for violation of the conservation laws of the state. The violations concerned number 255 in November and 296 in December, 1935. The convictions were, respectively, 227 and 259; the remainder were of cases still open, cases lost, or those in which appeals to a higher court were taken. Fifteen different offences are listed. By far the greatest number of violations were of hunting laws, with trapping and fishing violations next in importance.

The names, addresses, nature of offence and outcome of all cases are tabulated. Such lists should have a most salutary effect on those who have been detected violating the conservation laws, and on others who may think that such an act is a smart or safe thing to attempt.

We note that Wisconsin has a law that should be on the books of every state that values its supply of wildlife. Licensed sportsmen are requested to report on the game taken. "Any licensee who wilfully fails or neglects to make such report shall not be granted a license *** for a period of one year thereafter."

•

Representatives of Illinois declared at the meeting of the Midwest Fish and Game Commissioners that they would fight for the right to hunt ducks over baited waters and would carry that fight to the United States Supreme Court. They contend this right to be a state right. This attitude, in light of the bloody and selfish record of the "butcher boys" of Illinois, is not surprising. Fortunately, however, the ranks of the sportsmen do include many intelligent and broad-minded men and the Illinois viewpoint may prove a boomerang. It looks as though Illinois were in a struggle with Maryland to determine which state will hold the "honor" of killing the last duck.



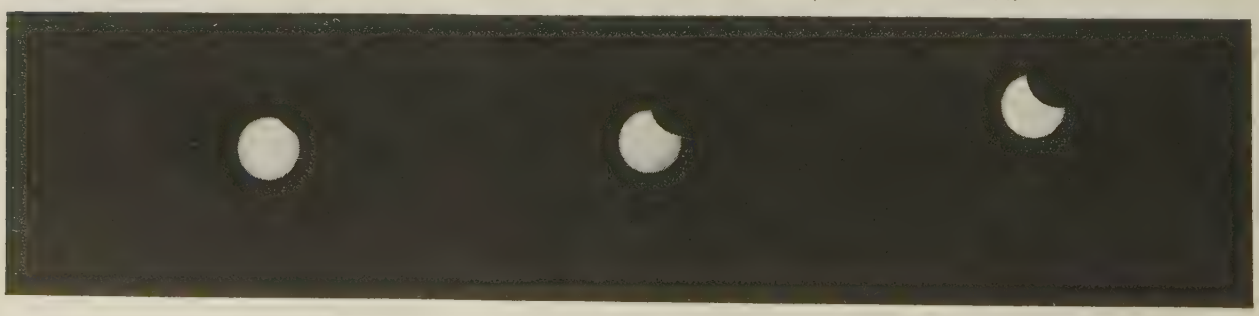
To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

ECLIPSE-CHASING IN SIBERIA

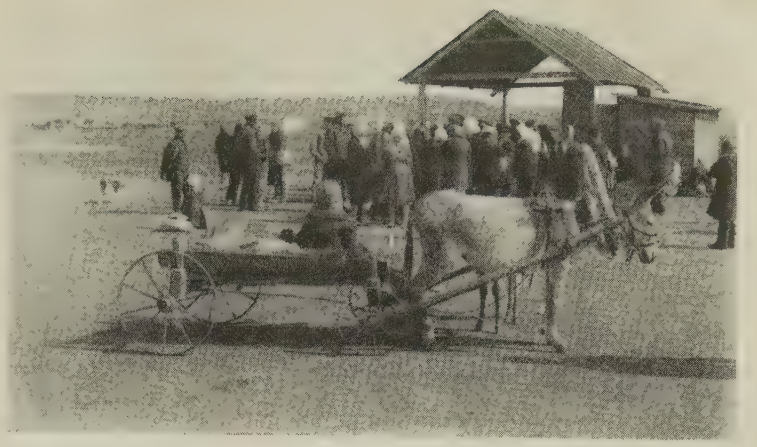
By ISABEL M. LEWIS

THROUGH the courtesy of Dr. B. P. Gerasimovic, Director of the Poulkova Observatory at Leningrad and in charge of the Organizational Commission for eclipse observations in the Soviet Union, Mrs. L. T. Day and the writer, both members of the staff of the United States Naval Observatory, were permitted to observe the total solar eclipse of June 19 at the station of the Harvard-Massachusetts Institute of Technology expedition of which Dr. Donald H. Menzel of the Harvard College Observatory and Dr. Joseph C. Boyce of M. I. T. were jointly

THE ECLIPSE AS PHOTOGRAPHED BY MRS. LEWIS AT 8:14, 8:24 AND 8:34 A.M.



in charge. This station was located in latitude 50°58′.3 North and longitude 55°47′.7 East on the Kirghiz Steppes in Southern Siberia about four miles north of the central line of total eclipse and nine miles distant from the small town of Ak Bulak on the Moscow-Tashkent railway. Within the same enclosure on the summit of a small knoll on a vast, treeless plain was also stationed the expedition of the Poulkova Observatory under Dr. Gerasimovic. Radio observations were carried on by other members of the Harvard party not only during the eclipse but over a long period before and after the phenomenon in the town of Ak Bulak, where, on a railway siding, were the in-town quarters of the expedition in three railway cars, one used for the radio observations, and the other two for sleeping and eating accommodations. A chef, interpreter, two Intourist representatives from Moscow and their assistants worked tirelessly to do everything possible for the comfort of the observers. Transportation to and from camp was by means of automobiles over bumpy trails. Often head-on collisions seemed miraculously avoided in the last split second when both drivers decided simultaneously to yield the right of way to the other to avoid disastrous results! There were said to be forty expeditions in the Soviet Union for the observation of the eclipse, of which twenty-eight were Russian and twelve foreign. These were widely scattered in five groups from the Caucasus mountains to Khabarovsk. Only one of these expeditions was defeated by rain. The best observing conditions were found at Ak Bulak and Omsk. At the latter station were two Soviet expeditions, one English, one Japanese and one Polish. On the whole the proportion of successful expeditions in the field was much higher than is usual.



CITIZENS OF AK BULAK GATHER NEAR THE MARKET-PLACE

The natives discuss the approaching phenomenon while the young man in the cart patiently waits for his father

Upon our arrival in Ak Bulak four days before the eclipse we found that the skies were becoming increasingly overcast and some one remarked it was heart-breaking weather for astronomers. On our trip to the camp two days later it rained intermittently but between showers Dr. Clyde Fisher, head of the Hayden Planetarium in New York City, was cheerfully at work with his fine battery of cameras obtaining both stills and movies of camp events. Instruments were covered to protect them from the rain and the lone camel water-carrier wailed dismally at his task of bringing barrels of water from a nearby stream to slake the thirst of the astronomers.

"Were we afraid of the eclipse?" the interpreter asked us. "Some of our people are," she added. There were those who thought it might be a sign of war. Possibly some of the old timers recalled the eclipse of August 1914, visible in Russia, when many eclipse expeditions already in the field fled from the country in haste upon the declaration of war, in some instances leaving their instruments behind them. There was, however, no sign of fear among the quiet, orderly and dignified groups of spectators that gathered outside the enclosure the morning of the eclipse and little need for the guard of soldiers that patrolled the camp boundaries during the night preceding and throughout the eclipse.

The day preceding the eclipse had been beautifully clear after the storm. We left Ak Bulak for camp prepared to sit up all night as the eclipse was to occur early in the morning. We were well supplied with blankets in addition to heavy clothes, for though the days were hot, the nights were cold. The sun was setting in a blaze of glory over the treeless plains as we approached camp about 9:30 P. M. The local time at Ak Bulak was that of the 75th meridian East of Greenwich, which we were told was also the time kept at all points along the trans-Siberian railway. This was ten hours ahead of Eastern Standard Time. In local time, the partial eclipse would begin at 8:13 A. M., totality would begin about 9:15 and last 117 seconds and the partial phase would end at 10:27 A. M.

THE ECLIPSE AS PHOTOGRAPHED AT 8:44, 8:54, 9:04 AND 9:09 A.M.

Few slept that night. Dusky forms carrying flashlights moved noiselessly about making last-minute adjustments or preparing to load plateholders. Heavy clouds gathered again after midnight, and though the sun rose magnificently in a clear sky it soon went behind a heavy bank of clouds. An hour before the beginning of the partial phase of the eclipse, however, the skies in the neighborhood of the sun miraculously cleared, and it was soon evident that there would be nothing to fear from the rapidly disappearing clouds. Soon after first contact there was a murmur of surprise and subdued excitement from the crowds outside the enclosure as a small notch was plainly visible on the western limb of the sun. The moon was visibly encroaching on the solar disk and the eclipse was "on," as predicted. With a stop watch, a small telescope and Leica camera attachment I attempted to photograph the progress of the eclipse at ten-minute intervals. According to the time shown by this watch which had been corrected by comparison with the chronometer earlier in the morning, the beginning of the total eclipse occurred about 3½ seconds before the predicted time. Dr. Gardner of the Bureau of Standards, who was next to me, was busily engaged in making photographic exposures with a fine nine-inch telescope of his own construction, but some time before he had placed on the ground nearby a sheet upon which, as a background, shadow-bands should be easily observed if present. Up to within one minute of totality when I last looked there was no trace of them. They were certainly inconspicuous if present later. In the eclipse of January, 1925, they appeared fully fifteen minutes before totality and were the most remarkable feature of the eclipse.

The flashing of the corona, remarkably beautiful and of the characteristic pearly white color, signalled the advent of totality. In type it was intermediate between the sunspot minimum and sunspot maximum, as was to be expected as sunspot maximum is several years away. Much to the delight of the Russian observers it strongly resembled a five-pointed star, which is the emblem of the Soviet Union. Rose-red points of light appeared at numerous places around the limb of the eclipsed sun. They were solar prominences chiefly of hydrogen gas, and produced a beautiful contrast of color with the pearly radiance of the corona.

The darkness of totality was not great enough to make the hands of a watch invisible. Beautiful sunset colors added to the splendor of the scene as did also the appearance of the planet Venus close to the sun. The hush that fell over the scene was an indication of the feeling of awe that inspired the spectators surrounding the camp at the appearance of the strangely beautiful coronal streamers and the weird duskiness of the sky and earth. The eclipse passed all too quickly for observers who had been working and preparing many days for this event. Yet within those few brief seconds scientific observations and records of such value may have been made not only at Ak Bulak but at other widely scattered points that they will more than repay the observers for all the time and labor they expended.

During the month of September all of the planets except Mars will be visible in the evening sky. Mercury will be at eastern elongation on September 4, but will be too low in the west to be seen to advantage. Saturn is in opposition on the 11th and visible all night in Aquarius. Jupiter is in Ophiuchus and sets about four hours after the sun. Venus is still low in the west at sunset.

AT THE HARVARD-M.I.T. EXPEDITION HEADQUARTERS

A complaining camel was used to haul the camp's water supply from a near-by spring. The animal didn't like his job and continually wailed about it

•

Some years ago Lorene Squire made her literary début in Nature Magazine with a delightful article and some splendid pictures. Since then she has contributed now and then to our pages and to a few other publications. We are glad to welcome her back in the October issue, again with a charming article and fine pictures. Another interesting feature in October is given the title "Fungiphobia" by its author, Wendell F. Oliver. By this he expresses his interest in fungi, their study and collection, and his article deals with a unique way in which he has made a permanent collection. Ernest E. Stanford writes an interesting and informative article on our conifers and how to know them, and Dr. Leon Augustus Hausman introduces us to the smallest plant in the world. Another gem article is one on tourmaline.

• • •

Trailside Treasures

LITTLE GREEN LADY

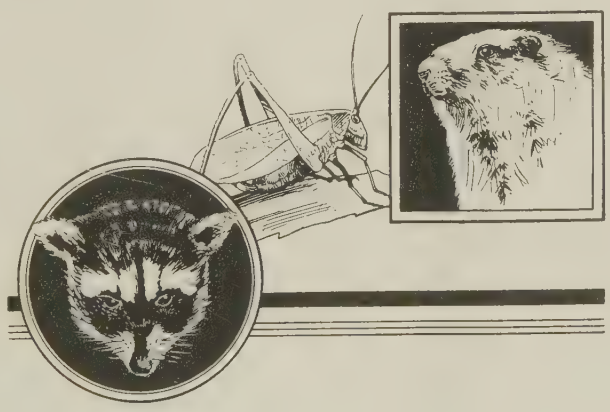
By JANE ADAMS PARKER

"My, it's nice up here in Treasure House," exclaimed Tommy, looking around. "Why, what's this? Look, Johnny!"

"He's Rickey, the raccoon you caught in the trap," Jerry answered. He made a clucking sound through his teeth, and Rickey came running across the floor to meet them. "He's so tame he goes in and out whenever he wants," went on Jerry. "It seems as if he doesn't care to go away, at all."

"Look, here's a woodchuck," laughed Johnny Barlow.

"Yep," said Jerry, "Jackie Knight's uncle took him away from a hawk. He can do all sorts of cute tricks, too. Rickey was real cross to him at first. But now they are the best of friends. Those little birds eating the crumbs on the window-sill outside are the ones whose mother was killed with the slingshot. They stay in that big maple tree all the time. That big robin in the tall wire cage near the wall had an injured wing. Aunt Dot found him out in the chicken-yard and brought him in to doctor up. He's almost well now."



"Shucks!" said Tommy, "it's lots more fun, I think, to tame the wild animals like this than it is to shoot at them."

"May I bring my brother Bill over?" asked Johnny. "I don't believe he'd shoot at any more owls and things, if he saw some of your pets, up here."

"Sure," Jerry answered, "and bring Donald Dawson too. Listen, there's Mr. Jake, the snake man. He said he might come this afternoon. I knew his voice the second I heard it the other day down at Willow Stream. That's why I started on the run up the trail. He just got back from the south, last week."

As he spoke, Mr. Jake followed by Aunt Dot and Grandpa Arnold came in. But hardly had they stepped inside when Jo and Rosy came clattering up the stairs, their cheeks flushed with excitement.

"It's a katydid Rosy found," Jo explained, breathlessly. "Get out the other magnifying glasses, Jerry, so the boys can study it too."

"Katydids are hard to find," went on Rosy, proudly, "because they are the color of the leaves they hide among. I call this one, Little Green Lady, for it looks so like a little old lady with a shawl around her shoulders. These green wings are the wing-cases, I suppose. But they're not all hard and dried up like those of the cricket. Wait, let me open the cases, so you can see the lovely gauzy inner wings. Just the tips that stick out at the ends of the cases are green."

"The katydid's wings lock open, when it flies," said Mr. Jake. "And notice what big eyes it has. They are made up of a great many smaller ones, so it can see as well by night as by day."

"I didn't know a noisy old katydid could be so pretty," said Tommy. "Its feelers are like long green threads. And its hind legs are so long and

thin, it must be a good jumper, just like the frog."

"You're right." Aunt Dot patted Tommy's shoulder. "It is a good jumper."

"I found its ears," shouted Jerry, "right down in the forelegs, below the knees."

"How does Mrs. Katydid sing?" asked Johnny.

As the others laughed, Grandpa said slowly, "This one *is* a Mrs. Katydid, Johnny. Notice that long curved, sword-like tip at the end of her body. Look closely and you'll see it has sharp teeth like a saw. That's what she uses to make a rough spot on the bark of the twig, where she glues her egg. But Mrs. Katydid doesn't do the 'singing,' as you call it. Mr. Katydid makes all the music, by drawing one wing-cover over a little music place in the other wing-cover close to where it grows out of the body. The young katydids don't have any wings. So, of course, only the full grown ones make the music."

"Come on, Tommy," said Johnny. "I promised Mother, I'd be home soon. Thanks a lot for showing us all your treasures."

When the two boys had gone, Aunt Dot turned to the children. She said, "The Trailside Museum has surely done a lot of good both for you and for other children. I hope that many museums will be made by other children." And the children agreed that it would be a fine thing.

•

Weasels and Ermines

By CLARENCE M. WEED

THE WEASEL has a long, slender body that enables him to penetrate the crevices and burrows that shelter the mice, moles and shrews that he seeks as food. Weasels are good hunters, and once they get on the track of another animal they follow the scent as a dog follows the scent of a fox. Several kinds of weasels are found in America and Europe. The New York weasel is one of our largest species. It is similar to the stoat of Europe. These weasels are brownish-red in summer but in winter they are pure white except for the black tips of their tails. These white weasels are commonly called ermines. This change of color is of great value to the weasels, as the similarity to the snow protects them from owls and other enemies.

The stoat is one of the most famous of British animals. It is especially disliked by people who raise pheasants. A stoat will steal a pheasant egg, curl up into a ball with the egg in its arms and roll down hill without breaking the egg. J. T. Newman was fortunate in getting a photograph of this performance. The picture was drawn from that photograph. Sir Arthur Thompson, the English naturalist, records a strange happening. When walking across an open field he found many small birds standing in a circle surrounding two young stoats behaving in an extraordinary way. They were jumping into the air and turning somersaults. The watching birds seemed spellbound, but Sir Arthur was not sure whether it was fear or curiosity that held the birds' attention. He thought, however, that at the end of such a performance a bird would be in the clutches of each weasel.

Nature Magazine in School

A Department of Aid to the Teacher

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
Washington, D. C., Schools

Footsteps in the Forest

With the approach of September and the beginning of school, it is quite natural for teachers to think of the goals of science teaching. One of those upon which most of us will agree in idea, although we may express it in different ways, is the appreciation of our natural environment.

"Footsteps in the Forest" suggests the ultimate ideal in this respect. If it were possible for our schools to send out large numbers of young people who could read with keen pleasure such an article as this, the grave forest-wild-life situation which confronts this nation would be solved to a considerable extent.

However, such an appreciation cannot be gained in a day or a year. It is the outgrowth of knowledge and the feeling of satisfaction gained from happy experiences with trees and forest animals. September is the right time to begin a forestry unit. As many pupils will come back to school bringing collections of leaves, jars of soils, rocks, a stray feather, or a bone. These specimens should be exhibited to give other pupils an opportunity to share in the experience. Nuts or other tree seed can be planted if space is available and later, when the trees have grown a few inches high, transplanted with ceremony to some place where the trees can continue to grow. Excursions should be taken into the woods to collect specimens, to study soil and moisture conditions, the habits of growth of many types of forest life, such as moss, ferns, wildflowers, shrubs and trees, or to listen to the sounds in the forest. These experiences can be made so meaningful that the satisfaction which comes as a result will color all subsequent learning about trees.

On the other hand, the understanding to be developed should include conservation of soil and water as well as trees and wildlife. This can be accomplished by providing experiences from which pupils may derive these understandings. For instance, some understanding of the fact that water is being taken into the roots of plants and given out by the leaves may be obtained through making and watching a dish garden which has a close fitting glass top, and by putting celery stalks in water colored with ink. The idea that the soil of the forest acts like a sponge in holding moisture may be clarified by pouring water over two mounds of soil, one entirely bare, the other composed of leaves and humus.

●

What Do You Know About Honey?

As teachers are giving more and more attention to the keeping of bees in observation hives in classrooms, this article on honey will be particularly interesting to them. In observation hives, honey presents quite a problem. As these small hives consist of a narrow wooden frame with glass sides connected to the out-of-doors by a cable, only one brood frame and three commercial size honey frames can be accommodated. In consequence of this limited space the bees cannot produce enough honey to care for their own needs and so the pupils who observe them cannot have the pleasure of eating honey made in their own classroom. Indeed it becomes necessary in these indoor hives to feed the bees. This is accomplished by allowing a solution of equal parts of cane sugar and water to drop, from an inverted bottle, through a hole in the top of the hive. The bottle containing this mixture is covered with enough layers of cheesecloth to make the dropping a very slow process. This feeding must be kept up even during the summer vacation when it might be thought that bees could find enough food for themselves. In fact one janitor objected to "putting the bees on relief." This article gives some information which would enable a teacher to answer some of the many questions which an observation hive provokes.

●

Malheur, the Unfortunate

This is a story that illustrates so well what happens in a community when greed and exploitation of natural resources is the only consideration. The restless American looking for a frontier, will some day awaken to the sad fact that not only is there no more frontier, but in his greed to put under cultivation every inch of ground he has trespassed against the balance of Nature. In consequence a part of this land which he should not have taken becomes uninhabitable, making the rest less habitable for man as well as every living thing. It is only through the resulting loss of human life and property that this lesson can ever be learned by the rank and file of those who are already grown up. To the children, however, a more rational point of view can be given. In motoring through a countryside where drought has produced a shortage in the water for crops and stock; or dust storms take their toll of the best soil; or where the road and bridges have been swept away in a flood; or where fertile fields have washed away and formed huge gullies, parents can indicate the possible cause of such conditions—deforestation and over-cultivation. In other sections of the country there are farms that have remained in the same family for generations and where animal life and forest conditions remain much the same because the principles of conservation have been passed on from father to son when the son was quite young. It should be pointed out to children growing up in the present wildlife crisis that it is doubtful if the intelligent land owners and the government can act quickly enough to save many of the rapidly disappearing species. To the private land owner the question of patrol is a serious one. Perhaps if several owners of adjoining places could be given protection against hunters and trappers more progress could be made. Merely posting a place is not effective.

●

Ferns

This splendidly written article on ferns presents useful ideas for all levels of the school system. The elementary school pupil can enjoy ferns, learn to know some of them, the type of place in which they live, and the wide variation in the types of fronds. He can see the spores which will fall from these fronds if they are laid spore-side-down on a sheet of white paper and left for several days. He can scatter fern spores in a shady, damp section of his garden and wait patiently to see if anything comes up.

In the junior and senior high school the fern is a splendid example of distinct phases in a life cycle. In the earlier grades pupils should have acquired some knowledge of the life cycles of frogs and insects, domestic mammals and garden plants. The fern with its four distinct phases—the spore, the prothallus, the fertilized egg and the fern plant—is a more advanced example of this all important concept of cycles, which includes that of man himself. Through the idea of recurring cycles older pupils may appreciate their kinship with Nature and thereby derive some feeling of security.

●

Mystery of the Moss Agate

Of all the "treasures" which children take proudly to school, rock specimens rank high in popularity. These collections would be of much greater use to the school if each specimen were properly labeled with the name of the location where they were collected. This information would not only be of use later in identification but would also be of value in connection with the study of different types of rock formations.

Moss agates are especially good examples of the wide variation found even in one type throughout the realm of natural science. Collections could show range in color and design. Other specimens, such as those in which the "figure" could be brushed out would serve as illustrative material in answering questions regarding the formation of these rocks.

A chemist's "garden" of the type suggested in this article would not only contribute something to the understanding of one theory regarding the formation of this rock but would also be an interesting school exhibit.

Hiking and Camping Forum

Conducted by
ERNEST A. DENCH

Hiking and camping inquiries will be answered by mail if a stamped, addressed envelope is enclosed. Address the Forum editor.

CAMP COOKERY COMPILATION

Ten cents worth of camp cookery information which may save you dollars and also many precious hours seeking sources of supply.

That's the new Forum pamphlet, *Cookery in Camp and on the Trail,* in a nutshell. The 24 printed pages contain: Foreword—Camp Cookery Books for the Library Shelf—What's Your Grub List?—Gratis or Inexpensive Camp Cookery Pamphlets—Recipe Literature—A Week's Food Supply—Where Specialty Foods May be Obtained—Concentrated Beverages Hot and Cold—Cook Stoves and Accessories—Fire-Making Short Cut Devices—Cooking Utensils—Portable Refrigerators and Accessories—Food List.

Price 10 cents from association headquarters.

Hostels Cling to New England

The second season of operation finds American Youth Hostels, Incorporated, pursuing a conservative policy of completing one section (New England) before proceeding to the next. There are now 79 hostels. Starting from Pawling, New York, the hosteler can, by daily stretches, reach Fryeburg, Maine—just over the New Hampshire border.

An isolated chain of three small hostels out on Long Island, New York, is for the exclusive use of hostelers from Europe, and distant U. S. A. points.

Betty Blodgett of the AYH executive staff is now on the Pacific coast. She expects to organize a hostel loop of 8000 miles—or 600 hostels located about 15 miles apart. They will radiate from such populous centers as Seattle, San Francisco, Denver and Chicago.

Independent groups of hostels are either operating or commencing in the Middle West. The Milwaukee Youth Hostel Club has a hostel at Port Washington; made a recent overnight trip rendezvous of the Wisconsin Go-Hiking Club. On leaving, the House Parents asked Go-Hikers to scour the grounds for large stones and dump them on the pile near the hostel. Looks like an annex is contemplated.

Juvenile or adult groups numbering from 25 to 60 persons are the preferred hostel units acceptable in certain of the Indiana state parks. No arrangements are as yet made for smaller parties. A free state parks booklet is available from the Division of State Parks, Lands and Waters, Department of Conservation, Indianapolis, Ind. Hostel reservations are also taken.

The Missouri Walk-Ways Association is following a logical development—trails first, hostels next.

Our Canadian friends now have a youth hostels association, in charge of which is Miss Dorothy Allen, 212 12 Ave., N. W., Calgary, Alberta.

The New England hostels, by their rustic charm and individuality, set a high standard which should be maintained elsewhere.

The bell at the old Wilmot, N. H., schoolhouse is rung when hostelers arrive and depart. How's that for atmosphere?

If one wonders what becomes of a blacksmith's shop in these gasoline buggy days, he should stay overnight at the Pequaket, N. H., hostel.

The barn adjacent to the parsonage is the hostel at Lincoln, Vt.

Springfield College (Mass.) has hostelers use one of its dormitories.

Amateur builders have an opportunity to assist in the restoration of a lovely old farmhouse at Sunderland, Mass.

Girls staying overnight at East Colrain, Mass., use the kitchen and recreation rooms of the church, while the boys take possession of the schoolhouse.

Wild berry picking excursions in season are organized by the "parents" of the Warren, N. H., hostel.

Travelers welcomed at the hostels are hikers, campers, bicylists and horseback riders. (Yes, the horse will be stabled and fed at the same rate as the rider.)

Unless you figure on at least three overnights in any calendar year, a hostel is no cheaper than a tourist house or small town hotel. An adult AYH pass costs $2.00 yearly, which, added to the 25 cents overnight toll, makes two nights, total $2.50. You are also obliged to purchase ($1.00) or rent (10 cents a night) a sheet sleeping sack. The more hostel overnights you make, the more you save. Youth has an advantage in that an annual AYH pass can be secured for $1.00. Any person under 25 years of age is eligible for it.

National headquarters are at Northfield, Mass., and 25 cents invested in the 1936 Handbook gives you the complete story to date.

Annual IOCA Conference

At the fifth annual Intercollegiate Outing Club Association conference, held at Newfound Lake, N. H., Dave Hawley stressed the policy of *always* going through with planned trips, even if only a few go on them.

The IOCA objectives, as summarized by Walt Williams of Union, are—"to get the graduates together, thus forming friendships between the members of different colleges, and to retain the active interest of graduate members."

When the eternal grub question came up for discussion, Walter Averill told of drying onions, carrots, baked beans and tomato paste in a slow oven, for use on trail trips when weight and bulk mean much. He admitted that the later soaking process was a painfully slow one, to restore the foods to their pristine freshness. He prefers desiccated eggs to the dried kind, and gave the source of supply. He also knows a powdered milk which stirs more easily than another brand. Forum editor now has this information and will relay it if a stamped addressed envelope is enclosed.

Smith College Outing Club acted as conference hosts. 20 colleges sent 80 delegates. Howard Cady continues as executive secretary.

September Gadget List

1. A liquid mosquito repellent developed by a chemist in Siam, and used for many years in the insect-infested tropics. The product exudes neither oil nor grease, and does not stain the most delicate fabrics, so the American importer claims.

2. Although not included in his catalog, an exploring expedition equipment specialist handles a line of imported walking sticks—the rough usage kind. One sent the Forum editor has a crooked handle and a spiked tip, and is very reasonably priced.

3. Steel poles, stakes and hinges, either separate pieces or units, for all kinds of tents. This specialist firm will send illustrated folder on request.

4. An antiseptic powder by a well-known drug house, for preventing athletes' foot.

5. A low-priced rain shirt of rubberized cloth, with a draw string collar and free arm movement. It succeeded in keeping the Forum editor dry from the neck to just below the waist on two rainy day hikes.

6. Nine kinds of dried vegetables, both cooked and raw. These foods are endorsed by the Appalachian Mountain Club and stocked by them for convenience of members. One ounce is equal to a pound of the untreated vegetable, it is claimed. No soaking needed; boiling water does the trick. Available in small quantities from the widow of the doctor who originated the process.

7. A combination slicing and paring knife, 8½" long, with a serrated edge, useful for various culinary operations in camp. Knife is light; of stainless steel, and has a colored handle. Red handle is recommended, as it is more conspicuous than any other color, and the knife is less likely to be left behind in the packing-up haste.

8. Lemon and orange crystals, packed in small and unique plastic containers with a metal screw cap, to prevent exposure to moisture, light and air. The lemon crystals make a substitute for sliced lemon in tea. A teaspoonful of crystals added to water makes a glass of fruit beverage.

If any or all of the above products interest you, write for the *September Gadget List,* enclosing a stamp to cover the cost of mailing it.

Will They Finish It?

J. Bradford and Raymond Mitchell started from Mount Oglethorpe, the Appalachian Trail's southern terminal, in May, and by late June they had covered some 600 miles. The two brothers, experienced Appalachian Mountain Club men, stand a reasonable chance of reaching Mount Katahdin, the Northern terminal. Their chances of success would have been greater had they reversed the 2054 mile route, thus taking advantage of the milder weather period in the north.

(Continued on page 188)

STAMPOLOG ALBUMS

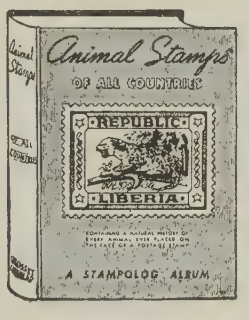
Bird Stamps of All Countries

Something unique in stamp albums, it provides space for all bird stamps issued, with an actual history of every bird pictured on the stamps and a story of every Bird-stamp issue. Stubbed to allow for expansion,

This book makes it possible to gather bird stamps from all over the world in one album and also supplies the collector with a rich fund of information about each bird.

Large size, measuring 11½ x 9 inches. 57 Pages, durable cloth binding, gay colored jacket. Price $1.00 a copy.

AnimalStampsof All Countries



Providing spaces for every animal stamp ever issued with a brief natural history of each animal. Stubbed to allow for expansion. Album pages on one side only. Profusely illustrated.

This book stresses the educational value of postage stamps not only to children, but also to adults. It informs the enthusiast why and when certain stamps were issued.

Size 11½ x 9 inches, 60 Pages, durable cloth binding, colored jacket. Price $1.00 a copy.

Combine a study of Natural History with your hobby of stamp collecting

NATURE BOOK DISTRIBUTORS
1212 Sixteenth Street, N. W., Washington, D. C.

Enclosed is $—— for which send me postpaid the following stamp album.

Bird Stamps of All Countries
Animal Stamps of All Countries

Name .....

Address .....

.....

Educational Films

Film strips on such subjects as farm crops, dairying, farm animals, farm forestry, plant and animal diseases and pests, etc., always popular with extension workers, teachers, and others, will be available from the Division of Cooperative Extension, Department of Agriculture, at approximately the same cost as they were for the past fiscal year. The prices for film strips until June 30, 1937, will range from 50 cents to $1.10 each, depending on the number of illustrations in the series. The majority of the 275 series available from the Department will sell for 50 or 65 cents each.

Don't Pick!

Four types of wild flowers are protected by law in Wisconsin and picking any of them on the land of another carries a fine up to $100 with an alternate jail sentence. The Conservation Commission is given the same power to protect these specified types of plant life as it exercises over protected birds, animals and fish. The flowers granted protection are lotus, trailing arbutus, trillium, ladyslipper and all members of the orchid family.

Cobweb Spinnings

Spinnings from the Cobwebs, according to the flyleaf of this book of poems, "is the fruit of long years of hard work and cheerful living." This is undoubtedly true, as David R. Churchill, the author, is the son of a Nebraska pioneer and made his living sharpening plows and shoeing horses. No man who did not live cheerfully could have written such poems as *Signs of the Times* and *The Summary,* both of which are contained in this volume. His poems are odes to Nature, and are tributes to home, honesty and patriotism. This excellent volume is available from the Caxton Printers, Ltd., Caldwell, Idaho, for $2.00.

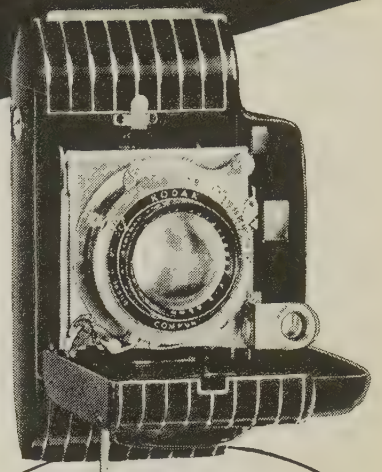
Year-Around Garden Book

Profusely illustrated with full page photographs, *Four Seasons in Your Garden,* by John C. Wister, is the book for all who love gardening no matter what time of the year it may be. The main purpose of the book is to point out the many different plants that may be enjoyed during the different seasons of the year from Maine to North Carolina and west to the Rockies. The volume is published by J. B. Lippincott Company, Philadelphia, and sells for $2.50.

Photographic Manual

Elementary Photography has been written from the viewpoint that interest in picture-making exists in young persons long before they have any desire to know the "hows" and "whys" of the art. Accordingly, the authors, C. B. Neblette, Frederick W. Brehm and Everett L. Priest, have written their book so that it will be suitable to students without prior knowledge of chemistry and physics. The book is a fully illustrated 253-page volume and permits individual self-instruction. It is available from the Macmillan Company, New York, at the low price of 72 cents.

NEW KODAK BANTAM SPECIAL



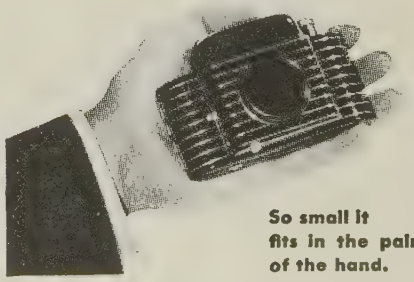
— a brilliant, distinctive miniature camera

AN ENTIRELY new conception in miniature-camera design, with the looks, "feel," and balance of a choice, exquisitely made instrument.

Eastman's new super lens—Kodak Anastigmat EKTAR *f*.2. 1/500 Compur-Rapid shutter. Military-type, split-field range finder, coupled with focusing mechanism. Stainless steel fittings. Brilliant die-cast, machined aluminum body, offering complete protection to operating parts when closed.

Makes needle-sharp negatives on Kodak Panatomic or Kodak Super X Film that yield excellent enlargements, the standard, low-cost size being 2¾ x 4 inches.

Kodak Bantam Special is a remarkable camera from every viewpoint. Price $110. At your dealer's... Eastman Kodak Co., Rochester, N.Y.



So small it fits in the palm of the hand.

Hiking and Camping Forum

(Continued from page 186)

Mass Camping

The new recreation demonstration projects of the Federal government will provide over half a million additional acres in which to camp or hike. These 46 tracts in 24 states will not measure up to the wilderness and scenic standards of our national parks and forests. They will, on the other hand, prove beneficial to many Nature-loving people residing in some of our large industrial cities. Lands too impoverished for farming are being acquired within fifty miles of populous areas.

What will these projects be like? The purchase of over 8000 acres in the Alleghenies of Central Pennsylvania takes the state's second highest mountain—Blue Knob, 3220 feet—out of private hands. Picnicking will be encouraged on the outskirts, while the interior will be reserved for organized camping and hiking. A trail system, including overnight shelters, is planned.

Mass camping will be the leading recreational development on all the 46 tracts. Each camping section will have tent or cabin quarters for from 150 to 200 children and adults. Management will be entrusted to social service agencies.

Dry Pack Trail Menus

The dry pack trail menu is the origination of Warren L. Rogers, guide and lecturer of the Pacific Crest Trail System. Last summer his YMCA knapsacking party completed 460 miles in 31 days. Each participant carried a 60 lb. pack. He is now piloting a similar party from the Tuolumne Meadows near Yosemite Valley, where last summer's party ended its trek from Mexico, to the British Columbia border.

The Rogers' dry pack plan is fundamentally sound. It requires only foods which can be procured at most any grocery store. It ensures well-balanced meals. It eliminates the carrying of liquids, as reliance is placed on finding water at campsites. The sole exception, on a four day series of menus, is a 4 oz. can of tomato sauce or puree, used to flavor the spaghetti and rice, and for the all-important vitamin content.

If one is on the trail for a longer period, the menus can be repeated every four days without becoming monotonous.

"Breakfasts should 'stick to your ribs,' and lunches light, with the feast reserved for suppertime," Rogers contends. And you can do it on 1½ lbs. a day. On 2½ lbs. a day, by tossing in canned goods, you can live on the so-called fat of the land. This is possible if, by pre-arrangement, you have a friend or relative with an automobile render a re-provisioning service at points where the trail crosses a highway.

The knack of a hearty and satisfying supper is to "plot" the menu around one main dish. A Rogers' evening meal consists of six ingredients, linked with either dried beef gravy, spaghetti, Spanish rice or Welsh rarebit, according to rotation.

If the Forum editor may be forgiven for inflicting a pun, the Rogers' mimeographed sheet has a lot of "meat" in it. Specify M-36 when sending along your nickel to Warren L. Rogers, 2040 S. 4th St., Alhambra, Cal.

A-T Overnights in Central Pa.

The Blue Mountain Eagle Climbing Club has compiled a list of the 18 overnight shelters and tourist houses either on or adjacent to the Appalachian Trail in Central Pennsylvania, from Lehigh Gap to Manada Gap, 89.10 miles.

A Manual of Walking

Any book which professes to be "A Manual of Walking"—the title of Elon Jessup's latest literary effort—should have a lot to unload on the subject of footwear. Jessup reviews, in logical order, the entire footwear range from the clumsy, heavy sabot—the wooden contrivance of the European peasant—to the ultra-comfortable moccasin of the American Indian.

The French espadrille—a canvas oxford—is Jessup's first choice for easy walking. It has a rope sole, and can be worn without hosiery. This morning a New York men's wear store chain is offering importations at $1.65 per pair.

Jessup soars sky high in his praise of the pac or moccasin boot. Recently a new Maine firm sent the Forum editor a pair for a try-out. He thought he knew footwear comfort before in his pet—the leather-top rubber boot—but he has revised his opinion after pac ease, lightness and flexibility. Although the maker advances no waterproof claims for this particular pac, it survived several rainy day trips with only a slight seepage at the tiptoes. The rest of his stockings were bone dry. For the name and address of the maker, write the Forum editor.

Are you aware that morning is a bad time for a shoe fitting? Your feet expand as the day advances.

Jessup throws cold water on those who must hoof their forty miles before they call it a day. Esthetic considerations should prevail to make walking a recreation rather than a stadium grind. The daily dose for those in good walking trim should be 20 miles—and 15 miles if one has an appreciation of beautiful scenery. Half as much is adequate for takers to the hills. The climbing part of a trip should be concluded by lunchtime, as is done by experienced club leaders. Hill climbers should acquire the bent-leg stride favored by country folk. A dawdling pace is tiresome, even to beginners.

The footwear fund or allowance should be depleted of $1.75 to purchase this practical little manual from Dutton's. It is worth a permanent place on the library shelf.

Rochester, N. Y., Club Discovered

Last year a Rochester, N. Y., Forum reader needed a local hiking club connection—and the Forum editor had to disappoint the lady.

A chance incident last month put him on the scent of the Genesee Valley Hiking Club, which has, since its birth in 1926, indulged in a game of hide and seek with the greater outside world. This could be rectified by a publicity committee.

The GVHC was the outgrowth of an Adirondack Mountain Club chapter. It has 63 members, and runs all-day Sunday hikes. In July and August picnicking and bathing trips are substituted.

The indoor headquarters are at the Rochester Museum of Arts and Sciences. Trips are made by private cars. Fred Perrin is president, and Harriet Troan secretary, with Mary Lou Moore as vice-president, and John Hess as treasurer.

Winter Preparedness

It is hard, in the early fall, after living a carefree existence, to board up the woodland cabin or beach shack for the winter. One yearns to continue those refreshing week-end escapes from city life. But what stumps most owners is the heating problem.

Ralph C. Bryant of the Yale School of Forestry had these stationary campers in mind, in his contributed article to No. 1 of *Connecticut Woodlands,* Connecticut Forest and Park Association periodical.

His discovery is an improved wood-burning stove of German manufacture. It burns low-grade fuel, the best results being obtained with air-dried wood. A year's seasoning is the normal period, but this can be accelerated by cutting the intended fuel into small pieces, stacking it to give it a chance to dry out quickly. Another short-cut is to keep a small reserve pile near the stove.

The main trouble with wood-burning stoves is they need frequent feeding, and also consume large quantities of fuel in excessively cold weather to generate the required heat.

This German innovation converts the wood into a gas; needs but one or two feedings a day, and, in addition, gives 75 to 90 per cent of the heat value from the *same* amount of wood which, in other stoves, seldom exceeds from 35 to 45 per cent.

This German model has an attractive external appearance, and sells for slightly less than fifty dollars, F.O.B. New York City.

Bryant anticipates that American manufacturers will imitate or improve upon the German stove once a demand for it is assured. As an inkling of the way the wind is blowing, the Connecticut Forest and Park Association has, since the article appeared, received many requests for action from its members. It has decided, as a temporary measure, to arrange with an American import firm to take orders for the stove.

An Enterprising Bostonian

Clarence C. Graf is a free-lance hike executive who resides in Boston. His specialty is the working out of old trips in new ways for the Appalachian Mountain Club, Field and Forest Club and the Outdoor Associates. He is a member of all three groups, and his summer leadership record was conducting seven trips in two months.

The highlights were a midnight to dawn ascent of Mount Monadnock and a crack of dawn walk up Mount Cardigan. The Field and Forest Club had the benefit of these White Mountains variations.

A Mid-West Conference?

For the past four years John Sheridan, Prairie Club official, has been busy trying to unite the various hiking groups in what he alludes to as the "plains states."

NEMA
(TETRACHLORETHYLENE C. T.)
WORM CAPSULES
effectively remove
Large Roundworms and Hookworms
Dependable, safe, easy-to-give worm treatment. Keep your dog worm free and thrifty.

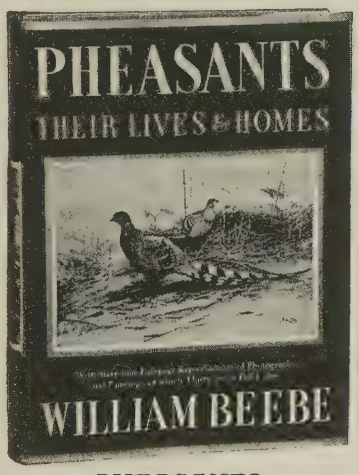
WRITE FOR BOOKLET NO. 652 on the practical removal of worms in Dogs of all breeds and ages. FREE
ADDRESS DESK N-21-I
Animal Industry Dept.,
PARKE, DAVIS & CO., Detroit, Mich.
Drug Stores Sell Parke-Davis Products

THE ARISTOCRAT OF *Beacon Hill*

In an atmosphere of quiet charm and dignity The Bellevue offers visitors tastefully furnished rooms and courteous, efficient service. Delicious meals are prepared and served in good old New England style. Location is convenient to shops, theatres, and business center. Rates from $2 single.

Glenwood J. Sherrard, *Managing Director*
HOTEL **BELLEVUE** BOSTON
Same management as the famous Parker House

HANDBOOK OF TREES
Photographic illustrations indicating size of leaves, fruit, winter buds, typical trunk; maps; enjoyable and lucid text. Anyone may learn to identify the trees east of the Rocky Mountains and north of the Gulf States.
New low price of $6.00
ROMEYN B. HOUGH CO., LOWVILLE, N. Y.



PHEASANTS THEIR LIVES & HOMES
By William Beebe
One-volume edition Price, $3.50
Formerly published in two volumes at $15.
The sportsmen—the breeder—and to those who find pleasure in the beauty and grace of pheasants, and to those who thrill in adventure—the announcement of this one-volume edition will be an unprecedented thrill.
This one-volume edition contains the same beautiful illustrations and text material as the two-volume edition.
64 full-page illustrations. 566 pages 8¼ x 11 x 2
Price, $3.50 postpaid
Send order today.

Nature Book Distributors
1212 16th St., N. W., Washington, D. C.
Send me the new one-volume edition of PHEASANTS: THEIR LIVES AND THEIR HOMES. I enclose $3.50 (check, P.O. Money order) in full payment.
Name .....
Address .....

Nothing has developed from his efforts so far, but he expects his spade work will bear fruit eventually.

We could do with a conference of clubs in the Middle West. The valuable work being done on the Atlantic coast by the Appalachian Trail Conference, and on the Pacific coast by the Federation of Western Outdoor Clubs and the Pacific Crest Trail System Conference, should stimulate our Middle-West friends to support John Sheridan.

Two Washington State Clubs

Mrs. Joseph T. Hazard ably edits *The Mountaineer* for the Mountaineers of Seattle. Local chapters serve Everett and Tacoma. Membership totals 593. A Junior Membership (14-21 years) recently came to pass with only three negative votes.

A gossipy mimeographed bulletin is handled by a committee of four for The Olympians of Hoquiam and Aberdeen. In browsing over the hike program, the Forum editor was baffled by the inclusion of an Officers' Mystery Hike for a Tuesday evening, of all times! Was the trip limited to officers, or did the officers keep the rank and file in suspense as to the destination?

The Olympic Peninsula is the terrain of the Olympians, now nearly 100 members.

Organized Hikes in Chicago Parks

With the aid of CWA funds, the Chicago Park District is conducting organized hikes and outings. John Sheridan, a Prairie Club official, is hikes supervisor, while Dorothea Nelson is hikes director.

Youngsters of from 8 to 16 years have a trip every Saturday. During the summer vacation period there are two or three events a week. After reporting at the playgrounds nearest to their homes, the children are escorted to the central assembly point by game room leaders. Interesting places in Chicago and the forest preserves are the hike objectives.

After six months of adult operation, with trip attendance varying from 25 to 150, it was decided to organize the Chicago Park District Hiking Club. To place it on a self-supporting basis, dues are 10 cents monthly, with a small entrance fee after January next. Officers are George Mercer, president; Everett H. Lang, vice-president; Andrea Van Eden, secretary; and E. A. Lawson, treasurer.

Dorset, England, Rambles

Walking in Dorset, a Macmillan book costing $2.50, will be enjoyed by Thomas Hardy enthusiasts and those who contemplate rambling in this charming English county.

While there are no mountains, hills do exist, the top-notcher being Pillsden Pen, 909 feet. Cliffs provide some rugged coastal tramps.

Joan Begbie left her auto at the starting point of a day's jaunt, and retrieved it at the journey's end. A collection of circular trips is the inevitable outcome.

Practically the only time the author left footpath or country lane was when—"We encountered a forest of nettles, head high, and as venomous as adders." Miss Begbie thought she was following an old Roman road, but it took an agricultural laborer to prove otherwise.

HUDSON
RANGER FIRE PUMPS

Be Ready for This!
When fire breaks out, you need help in a hurry! Be prepared—equip your cottage now with a **Ranger Fire Pump.** High-pressure stream extinguishes brush, grass or building fires. Easy to operate, costs but a little. Approved by State Forestry Depts. Used by Forest Rangers everywhere.
See your Hudson dealer or write us
H. D. HUDSON MANUFACTURING CO.
582 East Illinois St., Chicago, Ill.

FREE
PHOTOGRAPHIC ALMANAC
and **MONEY-SAVING CAMERA & SUPPLY BOOK!**
CENTRAL BARGAIN BOOK *Just Out* 132 Pages
Explains latest inventions, methods in Photography and Home Movie Making—**for fun and profits!** Offers hundreds of amazing, **money-saving Bargains** in still and movie Cameras, Films, Lenses, etc. **Used equipment accepted in trade.** Satisfaction guaranteed! **DON'T** buy any camera or supplies 'til you've seen this big, **free,** bargain book and **Photographic Almanac.** Write for Free Copy now.
CENTRAL CAMERA CO.
230 S. Wabash, Dept. T-9 Chicago
PHOTOGRAPHIC HEADQUARTERS SINCE 1899

RAINBOW SPECIAL
50 GUARANTEED TOP SIZE TULIP BULBS NO TWO COLORS ALIKE **$2.50**
A HAND PICKED SELECTION FROM AMERICA'S FAMOUS TULIP CITY
To acquaint you with Nelis Domestic Tulips—larger blooms, longer life, easier to grow—we offer a Special Rainbow Collection of Fifty Choice Bulbs—no two varieties alike—for only $2.50. Worth over Four Dollars if bought separately. Guaranteed to grow full size blooms next Spring. **Now** is the time to Order!

NELIS TULIP FARM
R-6 HOLLAND, MICHIGAN
SEND FOR FREE CATALOG

Learn Photography at HOME
Splendid opportunities. Prepare quickly in spare time. Easy method. No previous experience necessary, common school education sufficient. Many earn while learning. Send for free booklet "Opportunities in Modern Photography", particulars and requirements.
AMERICAN SCHOOL OF PHOTOGRAPHY
3601 Michigan Ave. Dept. 1606 Chicago, Illinois

FLOWERING BULBS AUTUMN RARITIES
Pink Lily of Valley, Plume Hyacinth, Butterfly Tulip, Foxtail Lily, Black Calla, Autumn Daffodil, Hardy Begonia, etc. Unique Catalog, Dept. N.
REX. D. PEARCE MERCHANTVILLE, N. J.

NATURE BINDER

Preserve your copies of Nature Magazine in a finely-grained, dark green, gold-embossed binder $2.00

AMERICAN NATURE ASSOCIATION
1214 16th St., Washington, D. C.

On Our Domestic Animals

There recently has been issued a volume which it is believed will be deeply interesting to those of us who delight to observe the habits and peculiarities and mannerisms of our various common domestic animals. Written by Dr. H. H. Dukes of Cornell University, with chapters by Drs. E. A. Hewitt, G. W. McNutt, and H. D. Bergman of Iowa State College. It is entitled *The Physiology of Our Domestic Animals,* and is published at Ithaca, New York by the Comstock Publishing Company at $6.00. Because our knowledge of this subject still presents so many gaps, the authors have been compelled to draw freely on the information derived from researches made on laboratory mammals and from published literature, and these have been brought together in an interesting and readable form. In addition to treatment of such themes as circulation, respiration, digestion, absorption, metabolism, and reproduction, together with discussion of muscle and nerve, endocrine organs, central nervous system, special senses and the like, it contains a great deal of miscellaneous information regarding our pets and other common animals and their health and care and is presented in such a way that it easily and readily may be made available when wanted. All those who may be interested in the subject should find this a valuable adjuvant to more formal reference books.

Grand Canyon Geology

Those who pursue the interesting study of geology will be interested in a pamphlet just released by the Grand Canyon Natural History Association entitled *Contributions to Grand Canyon Geology,* available from the Association at Grand Canyon, Ariz., for 15 cents.

Life of the Past

Those who are interested in and desire to make any serious study of the life of the past, now represented by fossils, will be greatly aided by the new book *Invertebrate Paleontology* just issued by the McGraw-Hill Book Company of New York. Prepared by William H. Twenhofel and Robert R. Shrock, both professors in the University of Wisconsin, the subject is approached from the viewpoint that fossils are no longer to be considered as mere lifeless stone, but as entities of a once living world. Each invertebrate group has been treated with a fullness and completeness commensurate with its comparative importance. The fact is made clear that fossils represent adaptations to and products of the environments in which they and their ancestors once lived. There is also pointed out the competition with which they and their plant and animal associates once lived as organisms in the intricately woven fabric of organic development, and as beacons along the road of time, marking off successive changes of earth history. The volume contains 511 pages, and 175 illustrations, and is priced at $5. Those of our readers who have found it interesting and instructive to form cabinets of the fossils they have collected and who may be puzzled by their peculiar markings or odd structures will find this book of genuine helpfulness in answering their queries.

NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

On the Floor of the Ocean

J. E. Williamson was the first man to take undersea photographs. His first "stills" were followed by motion pictures of marine life, and this, in turn, resulted in the production of actual undersea stories for the cinema. His production of Jules Verne's *20,000 Leagues Under the Sea* capped a long struggle for recognition. Mr. Williamson now has turned his efforts to collecting undersea specimens for the Field Museum of Chicago. His book, *Twenty Years Under the Sea,* tells of his adventures with devilfish and sharks, and his amusing and sometimes near-tragic experiences in taking undersea movies. The book, illustrated with 54 undersea photographs, is available from the publishers, Hale, Cushman and Flint, New York, for $2.50.

Southern Michigan Birds

The Cranbrook Institute of Science, Bloomfield Hills, Michigan, announces publication of *The Resident Birds of Southern Michigan,* by William Henry Burt, a 43-page bulletin describing the appearance and habits of the birds of this region. It is excellently illustrated by George Miksch Sutton and can be had for 50 cents, coin or stamps, from the Institute.

"Ruth Visits Margot"

An appealing after-the-war story of France with the above title has been written by Roy A. Keech, an American soldier who has based his story on his own experiences. The story of France and the war, written for young readers, is told through the eyes of Ruth, an American girl who visits Margot during the post-war period. The book is available from the publishers, Albert Whitman and Company, Chicago, for $2.00.

"The Tropical Garden"

An illustrated book with the above title presents the subject of garden making in the tropics both from the angle of design and from the point of view of plants and their culture. Even the experienced temperate zone gardener has much to learn when he goes to the tropics. The book centers around the Hawaiian Islands, but should be of value to anyone who gardens in the hot countries. The authors are Loraine E. Kuck, a graduate of the College of Agriculture of the University of California, and Richard C. Tongg, a practicing landscape architect of Honolulu, probably the only American of Chinese ancestry in this profession in the United States. The book is priced at $3.00 from the Macmillan Company, New York.

Fern Handbook

A pocket manual on ferns has been prepared by Farida Anna Wiley to fill the need for a book that can be carried on field trips. It is easy for the collector to identify various species by the novel method used in this booklet, and even the uninitiated can name his discoveries without fear of error. The handbook is available from Miss Wiley at the American Museum of Natural History, New York City, for $1.00 plus 15 cents for postage.

"Green and Gold"

A booklet with the above title contains the interesting life story of the banana from the time it is planted in the ground to its appearance on the breakfast table. Written in non-technical terms by Berta and Elmer Hader, the story takes us from cave-man times, when the fruit grew wild, to the present, where we find banana growing one of the biggest industries of the tropics. The book is published by the Macmillan Company, New York, and is priced at one dollar.

Lives of Naturalists

If you will turn back some eight or ten years in your bound volumes of NATURE MAGAZINE you will find some brief and entertaining biographies of naturalists who blazed trails in the field of science. These were written by Donald Culross Peattie. Since that time Mr. Peattie has made an enviable place for himself in American literature, and has given us some of the most delightful volumes of recent publication. Now comes *Green Laurels,* the story of the lives and achievements of the great naturalists, further proving the author's skill and charm as a writer. He writes here of naturalists as distinguished from biologists, pointing out that he regards the former as outdoors men and the latter as essentially men of the study and laboratory. In treating his biographies he does not set them apart in chapters and carry each naturalist from birth to final resting place. Rather does he relate them one to the other in the whole picture of the development of Nature knowledge.

Mr. Peattie writes beautifully in a poetic prose inspired by a love of Nature and sincere affection for his subject. With his *Singing in the Wilderness* and *An Almanac for Moderns* he achieved wide attention from those who review books, and his latest volume maintains the high standard of his earlier works.

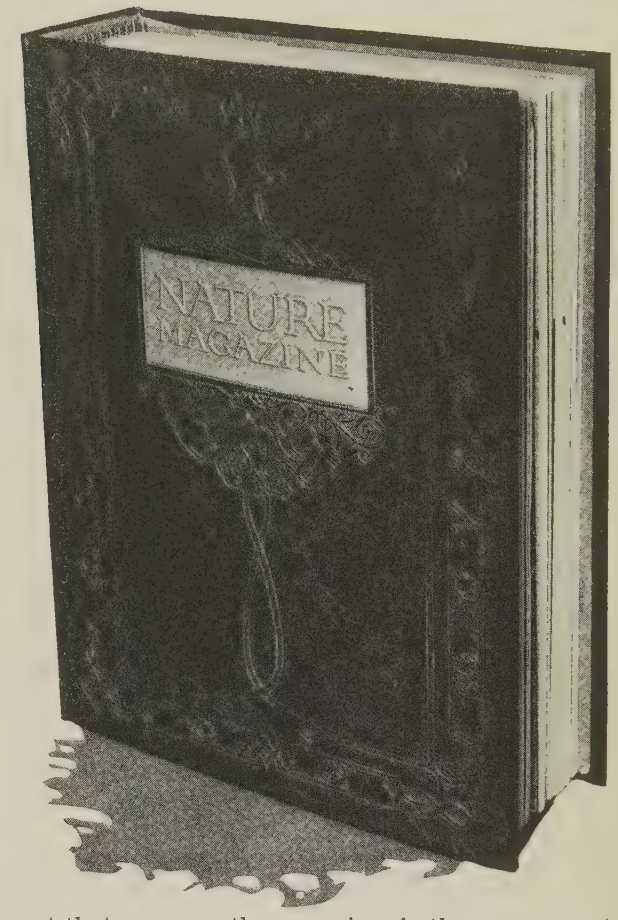
Green Laurels is published by Simon and Schuster, is illustrated and sells for $3.75. It is an addition to any library.

Where Credit is Due

Through oversight the pictures of the Pleasant Valley Sanctuary published in the rotogravure section of the August NATURE MAGAZINE were not credited to the man who made them. Mr. Arthur Palme of Pittsfield, Massachusetts, took this splendid group that so effectively indicates the beauty and value of this sanctuary. We hope that this belated credit will suggest to readers that they look back in the August issue and thus renew their acquaintance with this sanctuary.

LOST: Valuable Information

"We have misplaced our copy of the February issue of Nature Magazine. Please forward another copy. Enclosed is 35c....."



HOW frequently we hear this tale of woe—and it is inconvenient as well as costly for the subscriber. Each issue of Nature Magazine contains articles of lasting importance. Subscribers want to preserve every copy. There is a very simple solution to this problem—a binder into which each copy can be inserted as it is received.

We searched for the very best binder and found it. It looks like a book and it is a bound book in every respect except that you snap the magazines in the cover one at a time with a little unbreakable hooked wire. All the contents may be removed instantly and reinserted easily whenever you so desire.

THE CURRENT BINDER

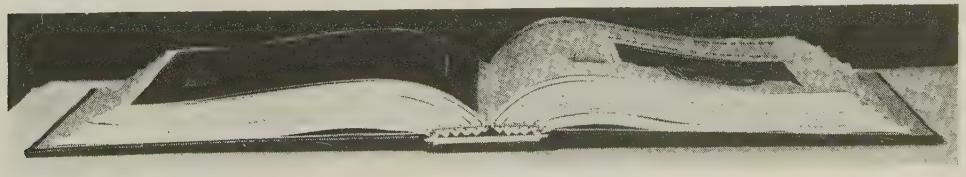
is handsome, finely grained, green fabrikoid with a gold-stamped nameplate on the front and on the spine. It is light, strong, and durable. It binds without cutting or punching the magazine. The unobtrusive binding device not only gives a handsome, bookish effect, but allows the filled binder to open as flat as a bound book. The parts of the binding device are light but strong. It is guaranteed against breakage, except through deliberate abuse.

Each binder will hold twelve issues. It has been made especially for the American Nature Association according to our specifications. At the end of the year you may remove the 12 copies and have them bound in a permanent, durable book for easy reference. No more lost copies—no more dog-eared or mutilated copies—an attractive, complete, ready reference replaces the old unsightly disorganized pile of magazines.

We are so sure you will like this binder that we will guarantee to refund your money if you are not entirely satisfied. Send for your binder today before this copy of your magazine gets mislaid. The price is surprisingly low—$2.00.

American Nature Association, 1214 Sixteenth St., N. W., Washington, D. C.

.... and best of all, it opens flat — like a book



CLASSIFIED ADVERTISING

ARCHERY

RAW MATERIALS, finished tackle, fine yew bows. Expert advice. **Hobson, Salem, Oregon.**

FISHES

AQUARIUM NEWS, a monthly magazine devoted to the study of everything pertaining to the "aquarium hobby," breeding, rearing and care of Gold and Tropical Fish. Aquatic plants, garden pools, and the newer Marine Aquarium and its inhabitants, all written in an authentic and interesting manner by leading fanciers and scientists. Special features in every issue for the beginner and a section on Aquarium Society activities. Well illustrated and a different cover in color each month. Hobbyists, students and teachers will find it most helpful and instructive. Send for a copy at once. 10 cents single copies, $1.00 per year anywhere. **Aquarium News Pub. Co., 100 South Avenue, Rochester, N. Y.**

HORTICULTURAL

CHOICE NATIVE PERENNIALS—Three each, Virginia Bluebell, Golden Aster, Iris Cristata, False Dragonhead, Thermopsis Caroliniana; for $1.25. **Cedarcroft Gardens, Cookeville, Tennessee.**

3 BEAUTIFUL, showy Lady's-slipper plants $1 postpaid. Plant now. Also ginseng seed and plants. **Collins Nursery, Viola, Iowa.**

FALL-BLOOMING IRISES—FREE BOOKLET describing all varieties of this new, odd type. Write to **National Iris Gardens, Beaverton, Ore.**

TREE PEONIES, finest named blooming varieties. Herbaceous Peonies, best varieties. **Oberlin Peony Gardens, Sinking Spring, Pa.**

RHODODENDRONS—Wild Flowers—Catalogue. **The Three Laurels, Marshall, N. C.**

INDIAN CURIOS

100 Good ancient arrowheads $3.00; Tomahawk head 50c. Flint knife 25c. Illustrated catalog 5c. **H. Daniel, Dardanelle, Arkansas**

PETS

RAISE RABBITS for us. We Pay Up to $5 each. Full details in catalog and monthly magazine. 3 months, 10c; yearly 25c. **Stahl's, Box 1, New City, N. Y.**

PHOTOGRAPHY

INCOME from your camera instead of expense. Low-cost, home study course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. **Universal Photographers, Dept. C, 10 West 33rd Street, New York.**

SEA SHELLS

OCTOPUS, diameter 15 inches, in glass jar $1.50. Forty different California Sea Shells $1.00. Catalogue. **Tom Burch, 633 E. 99th, Inglewood, Calif.**

HANDBOOK for Shell Collectors. 1100 pictures. Accurate information. $1. **W. F. Webb, Box 1854, St. Petersburg, Florida.**

STAMPS

TURKEY Mixture (approx. 500 stamps) over 100 varieties $1.25—50 Diff. SAAR $1.00—40 Diff. IRAQ $.75. **Rialto Stamp Co., 111 W. 42 St., N. Y.**

A New Translation of Amiel's Journal

"If man were truly good . . . he would be whole-heartedly adored by the animals. . . . The animal imposes on man a debt of protection and kindness. . . . The animal has rights over man and man has duties toward the animals." These words from the recently published new translation of *The Private Journal of Henri Frédéric Amiel,* the famous Swiss philosopher and Nature lover, are characteristic of his teachings. Edited by Dr. Bernard Bouvier of Geneva, the inheritor of the original manuscript, and translated by Van Wyck Brooks and his son, the *Journal* has been issued by Macmillan at $3.50, and is available for the first time in its present form to English readers. More than almost any other author of modern time this lonely, unworldly Swiss professor possessed the "wisdom of the heart." In this *Journal,* which began in 1847 in his 26th year, which filled 173 manuscript books, and ended with his death in 1881, there may be found the thoughts of an idealist who never evaded reality, and one who shared and faced almost every problem that rises in the lives of sensitive people. He had a tender sympathy for and a deep love of Nature in all of its endless manifestations, and his writings are full of wisdom, instruction and a moral beauty that captivates the reader. An entry on October 6th, 1866, regarding a vagrant kitten rescued by him is typical: "Little animals, little children, young lives are all one in their need for protection and kindness . . . all weak creatures feel at home with me . . . animals are glad to come and sleep on my lap; a little more and the birds would nest in my beard as they do on the headdresses of the saints on the cathedral. . . . The legend of St. Francis of Assisi is not as legendary as people think . . . a day will come when human virtue will be more exacting than it is today."

Two New Books on Ferns

So long as the more beautiful things of Nature continue to be of perennial interest, just so long will there continue to be placed on record the results of the studies of enthusiasts. Excellent examples of this are the two new books just issued entitled *Ferns of the Vicinity of New York* by John Kunkel Small (Lancaster, Penn. Science Press, $2.50), and *American Ferns* by Edith A. Roberts and Julia R. Lawrence (New York, Macmillan, $2.50). Written by the distinguished author of *The Manual of Southeastern Flora,* which has had in years past a very notable usefulness, Dr. Small's work presents possibly for the first time a popular, complete manual, carefully illustrated, of the ferns and fern allies of the New York region. The region covered consists of Connecticut, New Jersey, eastern Pennsylvania, and southeastern New York. Some 85 species are discussed and the more important phases of geological and floral provinces are considered, while altitudinal and geographical range and historical and literary facts add to its wider usefulness, as will also the author's suggestions for transplanting and cultivating various species in the fern garden.

Among the unique features of the latter book, by Misses Roberts and Lawrence, professors at Vassar, are the key for the identification of ferns throughout the year, and the addition of tables showing the time of spore collection, the duration of the greenness of the fronds, the number of weeks required for development, and the distribution of ferns in association with other plants. The value of ferns has long been known when placed in strategic spots in shrubberies or by garden pools, but under the guidance of these authors, the many different kinds take on individuality and become recognizable. The carefully selected illustrations add greatly to the value of the book.

"Pollen Grains"

There have been thousands of sufferers from hay fever who have longed to get more information about the various forms of plant pollen that bring about their annual agony. When such people turn the pages of the newly issued book, *Pollen Grains* by R. P. Wodehouse, and study the illustrations, greatly enlarged, of the many kinds of pollen, some bearing cruel spikes, others with long sharp spines, and still others with curious, nay, even fantastic, forms of sculpturing likely to bring irritation to mucous membranes of human beings, such unfortunates at least will know more regarding the microscopic causes of their distress. In addition to a comprehensive historical review of the subject from 1665 onward, there are sections on pollination, fertilizers, methods of collecting, and the like. Detailed technical treatment of the more important pollen-bearing plants occupy more than half of the bulk of the volume. One of the most important portions of the book is that containing a résumé of latest information on cutaneous reactions to pollen extracts and the treatment of hay fever. This will be the outstanding feature of the entire volume to many of its readers. The book is the latest addition to the well-known series of McGraw-Hill (New York) on the Agricultural and Botanical Sciences, and the price is six dollars.

Wild Fruits Attract Birds

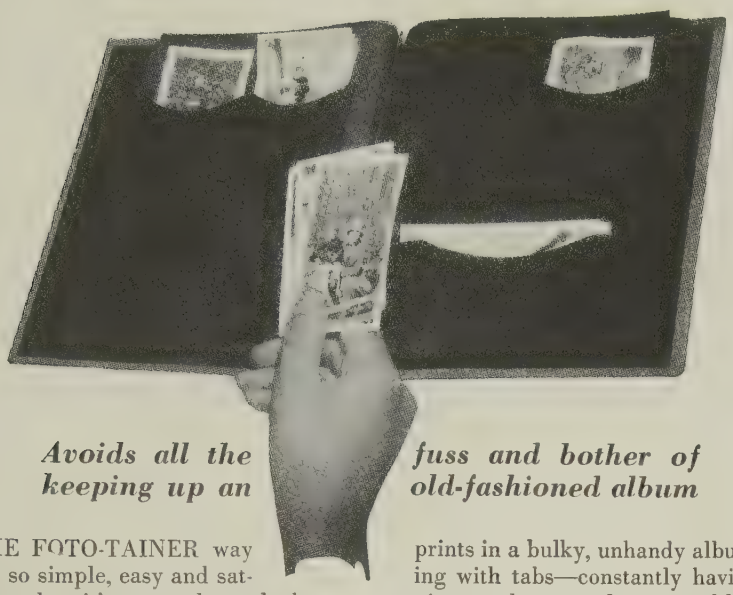
Bird lovers who want their feathered friends near their home for close observation should provide food, water and shelter. Wild fruits will attract cardinals, mockingbirds, orioles, flickers, and many other birds that are useful for insect control as well as beautiful. This diet will keep the birds away from domestic fruits, especially when the wild trees or shrubs are of the same species as the cultivated ones. Leaflets containing lists of fruits attractive to bird life in various areas of the United States are available from the Biological Survey, Washington, D. C., free of charge.

Bighorn Sheep Protected

An executive order by President Roosevelt has established a one-million-acre Federal game range for Nelson's mountain sheep, or desert bighorns, in southern Nevada. These animals were widespread in the rugged arid section of the Southwest before unrestricted hunting reduced their numbers to small scattered bands. Now, however, most western states have enacted laws protecting the bighorn throughout the year. The Desert Game Range, as it has been named, surrounds the Dixie National Forest and is located in Clark and Lincoln Counties.

Keep and Show Your Snapshots

This New, Better Way . . . with FOTO-TAINER!



Avoids all the fuss and bother of keeping up an old-fashioned album

THE FOTO-TAINER way is so simple, easy and satisfying that it's a wonder nobody ever thought of it before. The handy pockets of one compact FOTO-TAINER will take care of *six times as many snapshots* as a much more bulky album—and the prints in each pocket can be slipped out instantly to be "passed round."

People like to look over pictures if they don't have to hold and "wade through" a thick, heavy album. FOTO-TAINER enables you to keep pictures on each subject in separate pockets, and hand each person just the prints he wants to see—your last vacation trip, the latest snaps of the baby, etc., etc. Several guests can thus look over your camera work at the same time. FOTO-TAINER gives *everybody* the maximum pleasure from pictures!

No More Messy Pasting!

Don't waste any more time and patience pasting up page after page of prints in a bulky, unhandy album—fussing with tabs—constantly having to fix pictures that come loose—and laboriously lettering titles with white ink or pencil. With FOTO-TAINER you can note titles quickly on the backs of the pictures, classify them in separate packets, and you're done. Besides, you can "weed out" those no longer interesting and *rearrange your whole collection in a few minutes!* Also, FOTO-TAINER allows you to put in additional leaves as your stock of prints grows.

With a FOTO-TAINER you can take a greater pride in your pictures and win the admiration of your friends when you show them this new, *handier* way. And the handsomely bound FOTO-TAINER is a really decorative addition to your living-room table.

You cannot fully appreciate the convenience of this new way of keeping snapshots until you actually see a FOTO-TAINER.

TRAVEL SIZE has 6 removable leaves providing for 250 pictures of all sizes up to post-card size. (Extra leaves obtainable.)

The LARGE SIZE has 6 removable leaves, providing 36 pockets for 2¼ by 3¼ prints, or smaller—and 6 pockets for "post-card size" or 4 by 5 prints. Holds 500 pictures. (Extra leaves obtainable.)

Why This Way Doubles Your Picture Pleasure

No pasting, tabs or fuss

No white ink or pencil needed for titles. Write them on backs

You pass the prints, not the album

Several people can see pictures at once

Special groups kept together

Snapshots can be taken out and re-arranged, or discarded, at any time

Keeps six times as many prints as an album

New leaves can be added

Negatives can be kept with prints, if desired

NATURE BOOK DISTRIBUTORS
1212 Sixteenth St., N. W., Washington, D. C.

Gentlemen: Please send me the FOTO-TAINERS I have checked below. My (check, P. O. Money Order) for $..... in full payment is enclosed. These FOTO-TAINERS are fully guaranteed and if I am not completely satisfied I will return them to you and will receive a refund in full of the purchase price.

(Check squares before price of FOTO-TAINERS you want.)

	Imit. Leather	*Genuine Leather*	*Antique Cowhide*
Travel Size	☐ $2.25	☐ $2.75	☐ $3.50
Large "	☐ $3.50	☐ $4.25	☐ $5.50

NAME .....
ADDRESS .....
CITY ..... STATE .....

WHERE-TO-GO
Hotel, Resort, and Travel Department
1906 - Every Month in 8 Magazines - 1936

For space and rates write to The Where-to-go Bureau, 8 Beacon Street Boston, Mass.

TRAVEL
INDIA

The Taj Mahal
HAS A NEXT-DOOR-RIVAL

23 miles west of Agra is Fatehpur Sikri, most beautiful Moghul city in India. Visit the tomb of Saint Salim Chisti with its carved marble screens, delicate as lace. See the Pachisi Court where Emperors played human chess! First Class travel in India is inexpensive; cool, comfortable Second Class is 50% less! English spoken everywhere. Come via Europe or the Orient. Information: Delhi House, 38 E. 57th St., New York... or the better travel agents.

INDIA STATE RAILWAYS

ARGOSY CRUISES
Cargo Ships, Low Cost, Informal, Folder G
Send 3c. to cover mailing.
234 Clarendon St., Boston, Mass. Ken. 0980

WORLD TOURS

NO. 1...$579.90 UP
(Combination of Classes)

The world to choose from, *a la carte!* One inclusive ticket, good for two years. Tour No. 1 goes to Japan, China, Malay Peninsula, India, the Mediterranean, England. This, and the other five most popular routes, described in special folder. See *your own agent* or Canadian Pacific. New York, 344 Madison Ave., Chicago, 71 E. Jackson Blvd.; San Francisco, 152 Geary St., and 38 other cities in the United States and Canada.

Canadian Pacific

WASHINGTON D. C.
The DODGE Hotel
On Capitol Hill · Washington, D. C. Experienced men and women travellers enjoy our "No Tipping" service. $2 to $8.

Where-To-Go for Nov. closes Sept. 29

Photographic Notes

BY SAMUEL BROWN

STRIKING EFFECTS CAN BE OBTAINED BY USING A CONTRAST FILTER. TAKEN ON S.S. PAN, F 5.6 STOP, 1/30 SECOND, USING "F" FILTER

Autumn

October again brings us our most beautiful season. Autumn is synonymous with color; Nature has collected her forces and given us a host of photographic subjects. The season's glorious colors, the squirrels gathering nuts for their winters store, the birds' southward flight and the brilliant sun and cloud formations are some suggestions. October also is the month when we take to the trail and hike for miles with our cameras for constant companions.

To record Nature's brilliant colors, in order to retain their full beauty, we must exercise a special technique in the choice of film material, filters and exposure. Due to the many and varied hues of different colors, particularly of reds and oranges, it is best to use panchromatic emulsions. These are sensitive to the whole range of colors embraced in the visible spectrum. However, they are somewhat over-sensitive to blues, and a light yellow filter, such as the K-2, helps to eliminate this. Where full, perfect correction is required, an X-1 filter will be found most suitable, particularly with Panatomic and Super-Sensitive Panchromatic films.

Where a scene with clouds is to be photographed, a sky filter will be found useful. This filter is half yellow and half clear glass and in use should be so placed as to bring the colored portion to the top. Pictures taken in this manner do not require an increase in exposure but bring out the white clouds against a gray sky.

Dramatic cloud effects may be secured by using a "pan" film and placing a red filter over the lens. Red filters absorb all of the blue light and thus give extreme contrast between sky and clouds. Red filters should not be used if detail is required in a foreground object. Wratten "A" or "F" filters are of the type recommended. The former is somewhat lighter than the latter and requires an increase of 4½ times normal exposure. The "F" filter, which gives greater contrast than the "A", requires an exposure of 8 times over normal.

"EARLY NOVEMBER AFTERNOON" 1/25 OF A SECOND, F. 11

This season of the year is also a very good time to take Nature pictures in color. The gay brilliance of the colors and the contrasts of reds, greens, browns and blues make interesting studies. When working with color film it is always best to observe the old rule of having the sun behind the back. This gives a flat lighting that is ideal for this type of photography.

Our hikes take us into the woods and fields and along mountain trails where subject matter for our cameras is to be found on every side. The evenings are especially interesting. Beautiful sunsets may be photographed with a very short exposure such as F. 11 at 1/100 of a second. A filter is not required because the color of the sun acts as a natural filter. Pictures of this sort may be made attractive if it is possible to photograph the sun setting behind a mountain peak. Another fine effect may be had by photographing the sun behind a group of clouds with beams of light streaming down to earth. This effect can best be secured about two hours before sunset because at this time it is possible to include part of the foreground in the picture due to the low position of the solar disk.

The Autumn season is full of fine Nature picture opportunities and advantage should be taken of these to secure outstanding photographs that are not possible at any other time.

* * *

Films

In the past, our technical discussions have embraced the various types of cameras, lenses, shutters, etc. so that a suitable choice could be made when purchasing photographic equipment. After the camera owner has become familiar with the instrument that he is using, he must acquaint himself with the various types of films available.

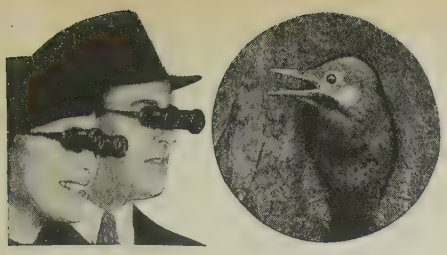
For the amateur there is available, in the form of roll film and film packs, three types which come under the general headings of *regular, orthochromatic* and *panchromatic.* There are also several emulsions available for direct color photography. These, together with the properties of each, will be briefly analyzed for the enlightenment of our readers.

Any discussion of films must of a necessity begin with references to the properties of films in general. The *color sensitivity* of a film is its ability to react to light of different colors. Those emulsions that are sensitive only to blue, violet and the invisible ultra-violet rays are called "color blind". Those that are affected by light of any color with the exception of spectral red are referred to as "orthochromatic" and film that is sensitive to all colors, including red, is known as "panchromatic."

The *speed* of an emulsion is judged by the amount of light it requires to form an image. Makers of films have assigned names to their emulsions such as "Super-X", "Superior", "Super-Sensitive", etc. to designate films with high speed ratings. Many systems have been devised whereby emulsions are rated according to their comparative speed.

The *grain* of a film is of particular importance in miniature photography. Grain is inherent in the film but may be controlled somewhat in development. The undeveloped emulsion is composed of an infinite number of silver grains which have a tendency to clump during processing. To offset this tendency, a fine grain developer is used.

Contrast is the ability of an emulsion to render differences in their corresponding degrees of brightness. A film capable of rendering a large number of shades is known as a "low contrast" or "long scale" film. One that is capable of rendering only a small number of shades is referred to as a "high



NOW—Telescope Eyeglasses

ROAM fields and woods, viewing distant objects with both hands free. Wollensak Allscope, hooked over ears like spectacles, serves as field glass. Light. Comfortable. Adjustable. Fits pocket easily in leather case. Great for nature study, motoring, baseball, football, races, etc. Meeting instant favor everywhere. Return yours for immediate refund if not delighted. Double power, $12.50; 3.25 power, only $14.50. At stores or direct, postpaid or C.O.D. Get yours today—try it.

CATALOG FREE Binoculars, Telescopes, Field Glasses, Microscopes, Allscopes, etc.

Wollensak Optical Co., 793 Hudson Ave., Rochester, N. Y.

WOLLENSAK MICROSCOPES • TELESCOPES RIFLESCOPES • BINOCULARS

MIRAKEL OPT. CO. DAYLUX BINOCULAR

POCKET PRISM NATURE GLASSES

3½ power $13 to $18; 5 power $13 to $17; 6 power $16.50 to $20; 7 power $19.50 to $35; 8 power $18.50 to $37.50. Microscopes $1. and up. Sent on approval, post paid. We carry everything in new and used glasses. Catalogue free. What have you to exchange?

J. Alden Loring Box K-2 **Owego, N.Y.**

192 PAGES *of* NATURE PICTURES

Only $1.00

These ROTOGRAVURE SEPARATES, taken from Nature Magazine, are available in sets of 12 sections (16 pages of pictures to each section) used for scrap books, mounting, posting, or other class projects. Extras of one particular month are 10c each provided at least 10 are ordered at one time.

NATURE BOOK DISTRIBUTORS
1212 Sixteenth St., N. W., Washington, D. C.

Please send me postpaid.....

Check for $..... in full payment is enclosed.

Name .....

Address.....

contrast" or "short scale" film. While contrast is another inherent property of the raw film, this also may be controlled to a certain degree in development.

Latitude is the property that is of the most value to amateur cameramen. There is an exposure that gives a perfect negative under a given set of conditions. More than this gives an over-exposed negative; less gives an under-exposed negative. Since it is impossible to give perfect exposures each time, we depend on the latitude or the ability of the film to give a perfect negative with more or less exposure than is absolutely correct. Some present day films have a latitude which permits as much as 15 times over or under-exposure and still produce negatives from which good prints can be made.

In subsequent issues we will analyze the various types of films and the uses to which each is best adapted.

* * *

Trade Hints and New Books

When using an exposure meter it is essential to know the speed of the film on which the exposures are being made. Manufacturers have conducted extensive tests in order to determine a standard whereby films can be rated by a universal system. A table giving a list of practically all of the films available in this country is obtainable without charge and may be secured by sending a stamped self-addressed envelope to this department. Ask for the "Plate And Film Speed Table."

* * *

From the Eastman Kodak Co., Rochester, N. Y., come three announcements of unusual interest to picture makers everywhere. One of them is concerning the new Bantam Special, Eastman's latest and best camera creation. The new high speed F. 2 Ektar lens, which is of ample aperture to take care of even the weakest lighting conditions, and the Compur Rapid Shutter with instantaneous speeds ranging from 1 full second to 1/500 of a second make a combination of outstanding versatility. A range finder of the split field type, coupled with the lens, assures sharp negatives at all times. This camera must be seen to be appreciated.

The new Eastman adjustable developing tank is suitable for the development of any amateur size film; is of the reel type which must be loaded in the dark and thereafter solutions poured in and out in the light and processing completed in this manner.

The last announcement and probably the most welcome to users of miniature cameras is the one regarding Kodachrome film for Bantam cameras and others using regular 35 mm. film. Movie makers have been delighted with Kodachrome 16 mm. film and this new development has been awaited with considerable anticipation.

* * *

Monsters & Madonnas by William Mortenson—spiral bound, 20 full page illustrations, published by Camera Craft Publishing Co., 425 Bush St., San Francisco, Calif. Price $4.00.

In *Monsters & Madonnas,* Mr. Mortenson has outdone all of his previous works in producing a book of outstanding beauty. For the first time, Mr. Mortenson reveals the methods whereby he achieves his remarkable results. The evolution of each illustration is told in detail from the conception of the idea to the completion of the finished picture.

FOR REAL INDOOR SPORT
Get an American-Made Graflex
ENLARG-OR-PRINTER

What fun you'll have enlarging your favorite negatives with this compact, efficient unit! Added improvements give even greater convenience, versatility, and ease of operation. With it, handsome, professional-type enlargements are limited as to size only by the quality of your negatives. In addition, it is a contact printer and retouching desk — almost a complete darkroom in itself. Ask your dealer to explain its many new features and to show you the new book, "Photographic Enlarging" — free with every ENLARG-OR-PRINTER or $3.50 when purchased separately.

National GRAFLEX SERIES II

"Just a Handful"

Many "big camera" features make this American-made GRAFLEX the world's finest miniature reflex camera. In the hands of thousands of owners the world over, it is securing superior pictures under all kinds of conditions—pictures that can be enlarged perfectly with the ENLARG-OR-PRINTER. It's just a handful, yet it gives you 10 album-sized pictures from every 8-exposure film.

Free! Send today for the new GRAFLEX catalog and the folder on "Photographic Enlarging" book. Paste coupon below on penny post card, if you wish. Folmer Graflex Corporation, Dept. E-2, Rochester, N. Y.

FOLMER GRAFLEX CORPORATION
DEPT. E-2, ROCHESTER, N. Y.
Please send me your new catalog on GRAFLEX All-American-made Cameras, Accessories and the ENLARG-OR-PRINTER. Also, folder on "Photographic Enlarging" book.

Name _____

Address _____

City _____ State _____

FREE
New Money-Saving Book of
CAMERAS & SUPPLIES!

Illustrates latest inventions, methods in Photography and Home Movie Making—for **fun and profits!** Offers hundreds of amazing, **money-saving** Bargains in still and movie Cameras, Films, Lenses, etc. **Used equipment accepted in trade.** Satisfaction guaranteed! **DON'T** buy **any** camera or supplies 'til you've seen this big, **free** bargain book of Cameras and Supplies! Write for Free Copy now.

CENTRAL BARGAIN BOOK *Just Out* WRITE TODAY!

CENTRAL CAMERA CO.
230 S. Wabash, Dept. T-10 Chicago
PHOTOGRAPHIC HEADQUARTERS SINCE 1899

MAKE MONEY with your CAMERA

FREE BOOK

Thousands of magazines and newspapers buy MILLIONS of photos from free-lance camera owners every year. We show you *what* to photograph, *how* to do it, *where* to sell for biggest profits. Learn at home, in spare time. No special camera needed. Write for FREE BOOK telling about this fascinating new field. **UNIVERSAL PHOTOGRAPHERS, Inc.**
1540 Sarosdy Bldg., 10 West 33rd St., New York City

NATURE BINDER

Preserve your copies of Nature Magazine in a finely-grained, dark green, gold-embossed binder $2.00

AMERICAN NATURE ASSOCIATION
1214 16th St., Washington, D. C.

THE LAND EVERYONE KNOWS

—yet doesn't know!

Bethlehem, that little town of Judea where Jesus was born . . . Nazareth, where he grew up . . . Bethsaida, where he took refuge . . . Jerusalem, where he spent that triumphant last week . . . are all familiar names. Yet how well do you know them? Have you ever wondered how they look now—how they may have appeared centuries ago?

The story of these places today, with a backward glance at what they have been in the dim but glorious past, is one of the most absorbing and inspiring of romances. It is told for you in a graphic series of articles soon to appear in The Christian Science Monitor—

THE HOLY LAND

51 ARTICLES OCT. 1-NOV. 30

Then and Now by R. H. MARKHAM

Through the "seeing eye" of this skilled observer, visit the land where for ages empires struggled. See Nineveh, whence poured forth the mighty Assyrian hosts; Babylon, the home of luxury and learning; Hebron, where Abram pitched his tents; Sinai, where Moses received the law; Nebo, where he viewed the promised land; Baalbek, famous for its stupendous ruins. Vivid, simple and accurate, the series has interest and value for Bible students of whatever creed.

The Monitor for these two months—October 1 to November 30—including all 51 articles of the series, is offered at the special rate of $1.00. It brings all the regular features of the Monitor, including the Weekly Magazine Section on Wednesdays. Send your subscription now on the coupon below.

THE CHRISTIAN SCIENCE MONITOR

An International Daily Newspaper

Published by The Christian Science Publishing Society, Boston, Massachusetts

THE CHRISTIAN SCIENCE MONITOR HLS
Dept. NM-10, One Norway Street, Boston, Massachusetts
Please send The Christian Science Monitor to the address below for the two months, October and November, including the series of 51 articles, "The Holy Land—Then and Now," for which remittance of $1.00 is enclosed.

Name .....

Address .....

Price of Regular Monitor Subscriptions:

☐ 1 month	$0.75
☐ 3 months	2.25
☐ 6 months	4.50
☐ 1 year	9.00

The Wednesday issue only, including the Magazine Section:

☐ 1 year	$2.60

Special Offer:

☐ 6 issues	.25

Essentially the book consists of twenty full page illustrations showing a finished picture. Much painstaking work has gone into the making of each and they are faithfully reproduced preserving all their charm and exquisiteness. The book is divided into three sections entitled "Characters", "Nudes" and "Grotesques." Every lover of beautiful pictures will want this book in his library.

* * *

Camera Conversations by Jay presents the choicest work of a real camera artist. It is hard to believe, in thumbing through the pages of *Camera Conversations,* that only one person can be responsible for so many beautiful pictures. Fifteen separate pictorial sections among which are found such tempting titles as "Winter", "Flowers", "Photographing Children" and "Animals" lead one through page after page of real photographic technique. If one's eye is willing to stray from the picture to the few printed words, one finds the title and technical data for each. I believe that Jay's success with the camera is due to the manner in which he photographs a simple, every-day subject. Point of view and subject matter are well chosen and the text interestingly written.

Published by the Macmillan Company of Canada, Ltd., 70 Bond St., Toronto, Canada. Price $5.00.

* * *

The photographic department of NATURE MAGAZINE is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic matter. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
SAMUEL BROWN

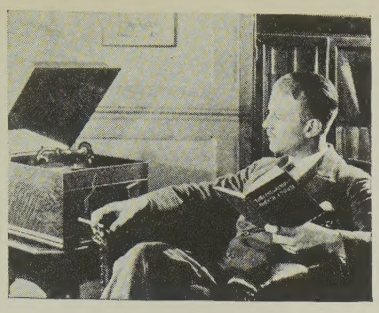
CHILD PSYCHOLOGY IN THE BIRD WORLD

By BARBARA SCHMITT WHITNEY

My husband and I were delighted and amused at breakfast recently by an episode outside our dining-room window, so amazingly human as to make an almost unbelievable bird story.

Having fed sunflower seeds all winter to a rose-taupe Mrs. Cardinal and a scarlet Mr. Cardinal from a feeding tray outside our window, we are this summer feeding, in addition, little Jenny and Jane and Jim Cardinal. (There seem to be two small females and one rose-spotted young male.) As soon as these three were able to leave the nest the parent birds brought them to the tray, and, shelling the sunflower seeds, put the kernels into the wide open mouths of the little ones. This feeding was accompanied by the constant trembling of little wings and a strange crying on the part of the babies, which sounded to us like the insistent ringing of little silver bells.

Soon we noticed that the young birds came alone to feed. They were very helpless at first, and, seeing their inability to crack the husks, we fed them shelled seeds at one meal. Deciding, however, that this was an unsound pedagogical principle, we straight-



The Modern THINKER MUST speak another language

THE world is growing smaller! Scientific miracles of land and air bring the ends of the earth closer together every day.

THE world is your neighbor! The Spaniard is in your back yard. And Paris is just across the street. Can you speak to your neighbor?

THE modern man and woman *must* speak another language, in order to *feel* and understand the thrilling pageant which the twentieth century is unfolding.

BEGIN now! Learn to speak French, Russian, Spanish, German, Italian, or any one of 23 living languages, by the new LINGUAPHONE METHOD which brings the living voices of native masters into *your own home.* You will be amazed how quickly and easily you can learn another language by this unique, effortless method.

Send for FREE book

Get the complete story of this world-famous language method endorsed by 11,500 universities, colleges, seminaries, high schools and foremost educators.

Linguaphone Home-Study Courses

FRENCH	RUSSIAN	JAPANESE
ITALIAN	GERMAN	FINNISH
SWEDISH	DUTCH	IRISH
POLISH	ENGLISH	ESPERANTO
LATIN	HEBREW	PERSIAN
CHINESE	SPANISH	BENGALI

Call for Free Demonstration at Our New Audition Salon

LINGUAPHONE INSTITUTE
84 Rockefeller Center
New York Tel.: CIrcle 7-0831

LINGUAPHONE INSTITUTE
84 Rockefeller Center, N. Y.

Without cost or obligation please send me your Free Book SD and details of your Pay As You Learn Plan.

Name .....

Address .....

City .....

I Wish to Speak .....

way abandoned it—and in little more than a day's time all three youngsters could not only feed themselves ably, but could drive away the sparrows that plagued them, as well.

However (and here is where my story really begins), one morning while Jenny was having her breakfast, Mother Cardinal flew to the tray to break her fast also. Before our astonished eyes and ears, the young scamp, who until that moment had been feeding herself with perfect ease, at once dropped the seed from her mouth and began the infantile fluttering of her wings, accompanied by her babyhood cry—which she could still muster, and which still sounded to us exactly like the ringing of a little silver bell. The mother gave no heed to this display—whereupon Jenny took a seed in her bill and shifted it about with the unmistakable pretense of being unable to shell it. This method of appeal she alternated with the whimperings and teasings I have just described, until Mrs. Cardinal—exasperated, as any mother would be—said to her, in effect, "Oh, do stop that nonsense, child!" and, slapping Jenny soundly with her bill, flew away. Thereupon (and to this I set my sign and seal) the little feathered child at once resumed her feeding in a sensible and very grown-up manner.

Field Manual of Trees

An excellent little book with the above title, chock full of material that makes identification of the trees of the northern United States easy, has been written by John H. Schaffner, former head of the Department of Botany, Ohio State University. The book, of handy pocket size, gives positive identification of each species at any time of the year. It is available from the publishers, R. G. Adams and Company, Columbus, Ohio, for $1.50.

Palisades Park Museums

The five regional museums in the Harriman section of the Palisades Interstate Park of New Jersey and New York are active centers of education in the varied and ample natural history of the Park, and constitute one of the most useful features of its camping department. These museums, housed in attractive and commodious buildings, present the animal life, plants, rocks and minerals of the Hudson highlands by methods that not only make these exhibits interesting and educational to youthful campers as well as adults, but also tend to rouse sentiment for conservation of wildlife. Public interest in the museums is emphasized by contributions of equipment and exhibits to Miss Ruby M. Jolliffe, to whom credit goes for making the museum a success.

An Anthology

The Squirrel's Granary, by Sir William Beach Thomas, is a delightful compilation of prose and poetry that shows us the beauty of the world of Nature from the sky blue heavens to the lowly anemone. The book is divided into nine Nature subjects and excerpts from famous writers, as well as the Bible, reveal that Nature has been in the mind of man since the beginning of time. The volume is available from the Macmillan Company, New York, and is priced at $2.50.

Ad Man and Author at 22

"Took the N.I.A. course at eighteen. Today at twenty-two am Assistant Eastern Advertising Manager of The Billboard, and editor of Ad-vents, monthly newspaper of the Association of Advertising Men of New York. Have just sold a story to Famous Detective Cases for $185. So as an ad man and author permit me to say, 'If you want to write ad copy or fiction, try N.I.A.' "

Joseph G. Csida, Jr.
3063 Williamsbridge Rd.
Bronx, N. Y.

Why can't you Write?

It's much simpler than you think!

SO many people with the "germ" of writing in them simply can't get started. They suffer from inertia. Or they set up imaginary barriers to taking the first step.

Many are convinced the field is confined to persons gifted with a genius for writing.

Few realize that the great bulk of commercial writing is done by so-called "unknowns." Not only do these thousands of men and women produce most of the fiction published, but countless articles on business affairs, social matters, domestic science, etc., as well.

Such material is in constant demand. Every week thousands of checks for $25, $50 and $100 go out to writers whose latent ability was perhaps no greater than yours.

The Practical Method

Newspaper work demonstrates that the way to learn to write is by writing! Newspaper copy-desk editors waste no time on theories or ancient classics. The *story* is the thing. Every copy "cub" goes through the course of practical criticism—a training that turns out more successful authors than any other experience.

That is why Newspaper Institute of America bases its writing instruction on the Copy-Desk Method. It starts and keeps you writing in your own home, on your own time. And upon the very same kind of *actual assignments* given daily to metropolitan reporters. Thus you learn by *doing,* not by studying the individual styles of model authors.

Each week your work is analyzed constructively by practical newspaper men. Gradually they help to clarify your own *distinctive* style. Writing soon becomes easy, absorbing. Profitable, too, as you gain the "professional" touch that gets your material accepted by editors. Above all, you can see constant progress week by week as your faults are corrected and your writing ability grows.

Have You Natural Ability?

Our Writing Aptitude Test will reveal whether or not you have natural talent for writing. It will analyze your powers of observation, your imagination and dramatic instinct. You'll enjoy taking this test. There is no cost or obligation. Simply mail the coupon below today. Newspaper Institute of America, One Park Avenue, New York, N. Y.

Free

Newspaper Institute of America
One Park Avenue, New York

Send me, without cost or obligation, your Writing Aptitude Test and further information about writing for profit as promised in Nature, October.

Miss
Mrs. } .....
Mr.

Address .....

(All correspondence confidential. No salesman will call on you.) 87J596

"Just 30 minutes
AND MY LUNCHEON'S ALL ARRANGED"
"I telephoned four girls, two stores and the florist in about thirty minutes. There's my luncheon arranged and off my mind."
The telephone puts the world at your finger-tips. It is a quick, dependable messenger in time of need—a willing helper in scores of household duties.
In office and home, these oft-repeated words reveal its value —"I don't know what I'd do without the telephone."
A telephone extension upstairs, beside the bed, is a great convenience at small cost. Saves steps and time—insures privacy.
BELL TELEPHONE SYSTEM

In October—Frank Bolles

By HOWARD ZAHNISER

WHEN October sears the oak leaves, says Frank Bolles in *Chocorua's Tenants,* a posthumous book of verse published in 1895,

> Silence settles on the forest.
> Southward have the swallows darted,
> Southward sped the warbler legions,
> Southward are the thrushes flocking,
> Crows complaining seek the Ocean.
> With the snowflakes o'er the mountains
> Hasten past the hawks from Northland,
> Speed along the titmice, juncos,
> White-crowned sparrows, wrens, and creepers,
> Tiny kinglets, sweet-voiced bluebirds,
> All in eager search for havens
> Where the touch of winter kills not.
> Close behind them come the crossbills,
> Come with joyous notes the redpolls,
> Come pine grosbeaks, too confiding,
> Come the hosts from Arctic nestings.
> Red the maples—red like heart's blood,
> Thick the leaves fall—thick as sorrows.
> High upon the oaks the squirrels
> Frolic fast among the acorns,
> On the moss beneath, the chipmunks
> Gather up the falling treasures.

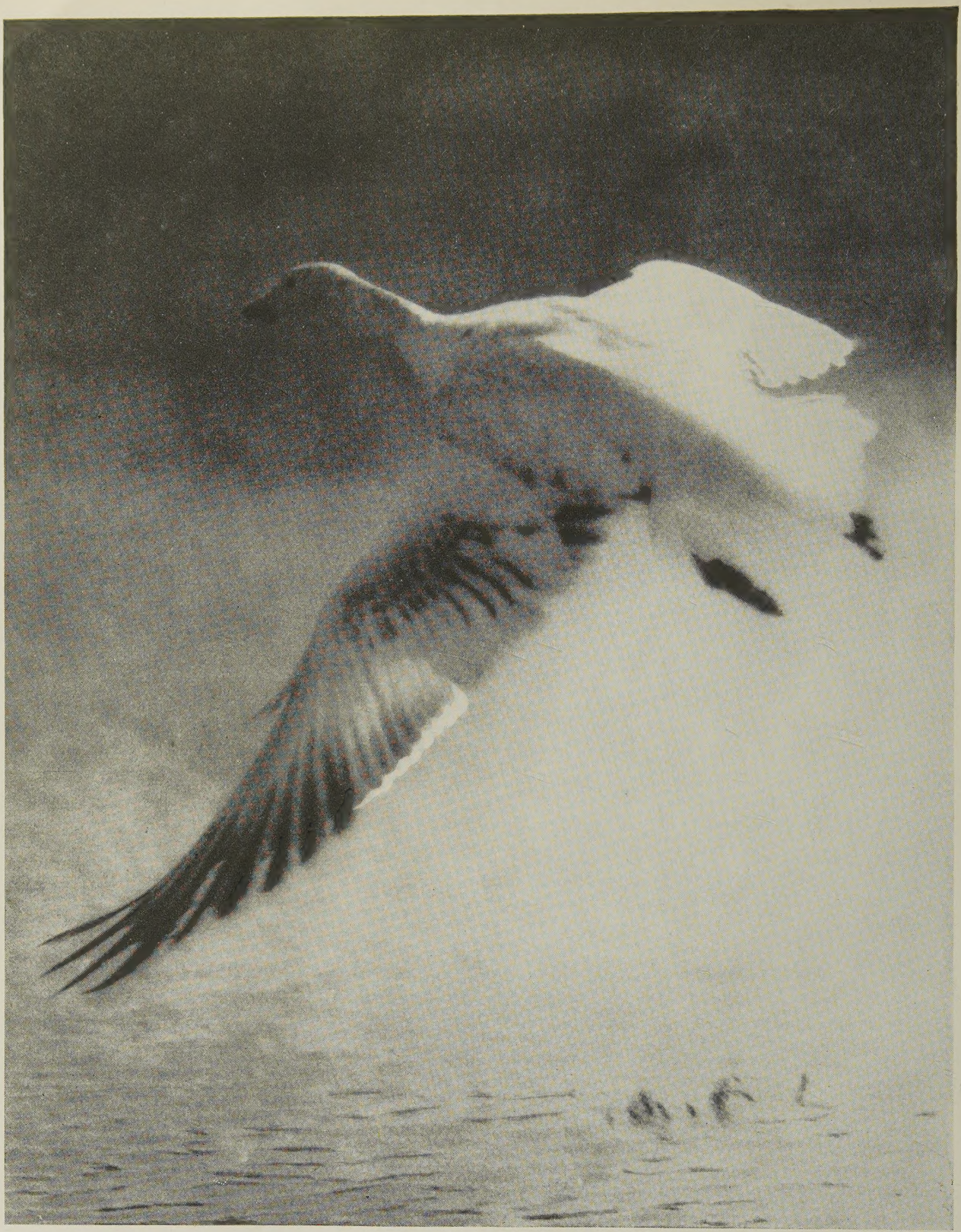
Few treasures more precious than the four books on the out-of-doors by Frank Bolles have fallen in the way of those who prize our American literature of Nature; and October, the month of his nativity, is chronicled in these books with an interest, a charm, and a faithfulness—an objective sympathy—that will commend them to any October reader. Two books that he himself saw through the presses—*Land of the Lingering Snow: Chronicles of a Stroller in New England from January to June,* in 1891 and *At the North of Bearcamp Water: Chronicles of a Stroller in New England from July to December,* in 1893—provide as thoroughly satisfying a Nature calendar as one might wish for; and to these were added a posthumous pair—*From Blomidon to Smoky, and Other Papers,* in 1894, a collection of essays most of which had been previously published in periodicals, and *Chocorua's Tenants,* all published by Houghton Mifflin.

Not only are the books by Frank Bolles valued for the observations and experiences they describe and relate; there is also a personal charm of style that makes rereading a pleasure and always repays even the odd moments spent with a volume taken casually from the shelf. Bolles calls the black-throated green warbler an "interesting scrap of tropical life." He asks, "What are the dunes?" and answers, "They are the waves of the sea perpetuated in sand." As he reaches the crest of a hill he describes the mountain Chocorua "beyond, above, dimly present in the smoky heaven as conscience is present in the mind of man." Describing the raccoon's footprints, he says: "If the dearest, plumpest baby in New England patted the soft snow with its dimpled hands, it could not make daintier images of its little palms than this wild creature of the forest makes with its feet, as it hurries over the new-fallen snow."

The life of Bolles is indeed a demonstration of the worth of the out-of-doors to all who will seek it. Living from October 31, 1856 until January 10, 1894, he was successively a law student, a writer and scholar in law, a journalist, secretary to President Eliot of Harvard, and from 1887 until his death the secretary of the University. His excursions and strolls and his writings on Nature were avocational, but they must have been a most precious part of his life, for the part that he has treasured up in books has such a richness for the reader of our own day.

Thus he writes of one October: "No matter how tightly the body may be chained to the wheel of daily duties, the spirit is free, if it so pleases, to cancel space and to bear itself away from noise and vexation into the secret places of the mountains. . . . As these bright October days slip by and my wheel of daily duties spins round and round in that granite prison called University Hall, my memory takes me back to fair Chocorua. . . . The sun struggled through soft gray clouds and gazed upon a world of magical opposites. Every maple in a hundred townships blazed with scarlet or gold; yet soft and cold, wrapping the earth from Chocorua's horn to the sand at the lake shore, the first snow of autumn sparkled in the rays of the rising sun. Skies of blue, forests of fire, fields of snow—those were the delights of that matchless October." In this way Bolles begins the chapter in *At the North of Bearcamp Water* entitled, "My Heart's in the Highlands", and through thirty-seven pages, all of that chapter and the following, "The Vintage of the Leaves", he writes of October an enduring and satisfying chronicle —waves of migrating birds; hawkweeds, goldenrods, autumn buttercups, yarrow, and red and white clover still in bloom; crickets, small green locusts, "spiders, houseflies, now and then a bee, small, gauzy-winged flies, and many a queer and, to me, nameless thing", a dragonfly, and "a solitary ant"; but, of course, from first to last the foliage.

A distant view suggested to Bolles "a painter's palette, upon which he had been daubing his colors from the tubes. Here he had laid on a mass of dark green, there crimson, and next to it pale yellow. Then buff and orange, scarlet and blood-red pleased him, and he rubbed them upon spare areas. Cobalt and ultramarine added here and there, with now and then a dash of silvery white or a broad band of burnt sienna, served to make the scarlets more intense and the yellows more aggressive." Elsewhere also the writer brings through the decades undimmed the brilliance of those forests that he once walked in. Bolles found at a small lake at the foot of Chocorua in New Hampshire a resort from routine existence, and his books today bring to any reader something of the freshness of living that Bolles found in the out-of-doors.



"FINALLY—THE SNOW GOOSE LEFT THE SLOUGH, WINGING TOWARD HIS NESTING GROUND IN THE ARCTIC CIRCLE."